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ON THE CHEMICAL COMPOSITION OF OIL OF BIRCH (BETULA LENTA, *Lin.*)

BY H. P. PETTIGREW.

A contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.

A thorough chemical investigation of the composition of the volatile oil of birch has never been made, although in 1844 Procter[1] first found it to contain salicylic acid, and from the similarity of the properties of this oil with those of oil of gaultheria he suggested the idea of an analogous chemical composition of the two oils.

Nothing more was written upon the subject until 1882, when Mr. G. W. Kennedy,[2] of Pottsville, made some experiments with it, by which results were obtained, indicating the presence of salicylic acid, and by which the identity of the oil with that of gaultheria was presumed.

In 1843, Procter made a series of experiments with oil of gaultheria, and in the following year M. Cahours[3] made a careful analysis of it, and found it to consist of salicylate of methyl, together with 10 per cent. of a terpene.

The oil used in this analysis was obtained through the kindness of Mr. Kennedy, and, being distilled by a friend of his, an oil of absolute purity was thus guaranteed.

The oil of birch when freshly distilled is a bright and colorless liquid, of considerable refractive power; it possesses a very agreeable and fragrant odor, closely resembling that of gaultheria, although a difference can be perceived when the two oils are compared. With age, the oil acquires a reddish color, of which, however, it is deprived

[1] "Am. Jour. Phar.," 2 ser., vol. 9, 1844, page 243.
[2] "Am. Jour. Phar.," 4 ser., vol. 12, 1882, page 49.
[3] "Jour. de Phar. et Chimie," Mai, 1843. Abstracted by "Am. Jour. Phar.," 2 ser., vol. 9, 1844.

by distillation. It has a specific gravity of 1·180 at 15°C. (59°F.), and its boiling point is constant at 218°C. (424·4°F.)

A portion of the oil when shaken with a concentrated solution of sodium bisulphite afforded no crystalline compound, thus proving the absence of an aldehyde.

The plan of analysis adopted was as follows:

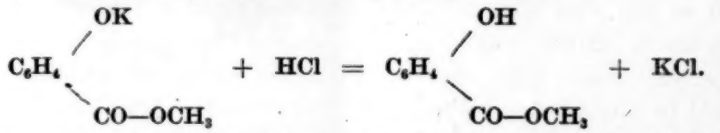
To 100 grams of the oil contained in a half liter flask provided with an inverted condenser a concentrated solution of 50 grams of potassium hydrate was added, which is somewhat more than the theoretical quantity required for the decomposition of the oil, and the mixture boiled for six hours upon a sand-bath. At the end of this time the oil was completely decomposed, and a clear liquid was obtained, without the separation of any oily layer, and also affording none upon dilution with water or upon supersaturation with an acid. This observation demonstrated conclusively the absence of a terpene, which, had such been present, would have remained undecomposed by the caustic alkali, and become separated at once or upon subsequent dilution of the strongly alkaline liquid with water. In this manner 400 grams of the oil were treated.

The resulting liquids were then distilled from a sand-bath until one-fourth of the entire amount had passed over; this distillate was then redistilled from a sand-bath; collecting one-fourth as before, and the latter distillate, which would contain all the methyl-alcohol, was then distilled from a water-bath, and further rectified and deprived of water by distilling twice from quick lime. This liquid thus obtained then possessed the unmistakable odor of methyl alcohol, and corresponded to it in its specific gravity and boiling point.

The liquid remaining from the first distillation, which would contain the salicylic acid combined with the potassium, was then slightly supersaturated with hydrochloric acid, whereby a dense white precipitate of salicylic acid was obtained. This was then washed with a little water, dried by exposure to the air, and purified by crystallization from hot petroleum benzin, from which it was deposited in light, colorless and lustrous crystals.

Upon adding a concentrated solution of potassium or sodium hydrate to the oil, as had been previously observed by Procter (*loc. cit.*, 1844, page 243), combination immediately ensues, with liberation of heat, and a white, crystalline compound is formed, which is decomposed by acids, with the separation of the original oil.

The composition of these compounds with the alkalies, in which the hydrogen atom of the phenol group of methyl salicylate is replaced by potassium, sodium, etc., and their decomposition by the action of an acid with the regeneration of the original oil, may perhaps be more clearly seen when expressed by an equation, as follows:



It is worthy of note that the specific gravity of oil of gaultheria, as stated in the United States Pharmacopœia (1880), corresponds precisely with that of oil of birch, while the specific gravity of an authentic specimen of oil of gaultheria in the possession of Prof. Maisch was found to be but 1·0318 at 22°C.

The lower specific gravity of oil of gaultheria may easily be explained by the presence in the latter of a terpene which is lighter than water.

The results obtained by the present investigation may, therefore, be briefly summarized as follows:

I. The volatile oil of birch is not identical with the oil of gaultheria, in that it consists entirely of salicylate of methyl, and contains no terpene.

II. The specific gravity of oil of gaultheria is not 1·180, as stated in the United States Pharmacopœia, but 1·0318; the former being the specific gravity of oil of birch, which, as is known, is often indiscriminately sold and employed as oil of gaultheria.

In conclusion, the writer desires to state that he has commenced the analysis of pure oil of gaultheria, and that the terpene which it contains, but of which at present so little is known, will be submitted to further investigation.

TINCTURA FERRI CHLORIDI.

By Mimms William Coleman, Ph.G.

From an Inaugural Essay.

As much discrepancy of opinion exists regarding the desirability of retaining the alcohol in the preparation of Tinct. ferri chloridi, it has seemed of interest to institute a series of experiments bearing upon this point, and also to extend the investigation to the determination of the result of other influences upon the preparation.

In preparing the Liquor ferri chloridi, according to the formula of the U. S. Pharmacopœia of 1880, the mixture of iron, acid, and water is to be raised to the boiling point after the cold mixture has ceased to effervesce. If the mixture be boiled at this point, a large quantity of the acid will be driven off and thus lost; and if the solution be filtered at the time directed, only about one-third of the acid will be neutralized. Much better results are obtained by a gentle heat applied for several hours, until effervescence again ceases, when the solution should be raised to the boiling point and filtered. After careful manipulation, using pure acids of the proper strength, the solution was found to have the specific gravity 1·390, and this was the highest that could be obtained by following the directions of the Pharmacopœia, which requires a density of 1·405.

On investigating the cause of this, it was observed that the admixture with nitric acid was to be performed in a capacious porcelain vessel. If so mixed, a considerable quantity is lost by the energy of the reaction, and the loss materially reduces the specific gravity of the resulting solution. It is probable that the experiments incident to the construction of this formula were made in a flask, which would prevent the loss of any portion of the liquid.

If this conclusion be correct, the specific gravity of the officinal solution is certainly wrong. On inquiry among pharmacists, it was found that the same trouble had been experienced by others.

The Pharmacopœia states that 10 grams of the solution, when completely precipitated by ammonia (NH_4OH), yields a precipitate which, when washed, dried, and ignited, should weigh 1·86 grams. These directions having been followed precisely, with a solution of less specific gravity (1·390) than the officinal, the residue weighed 1·882 gm. With the solution sp. gr. 1·390, the tincture was then made according to the officinal formula. The specific gravity was ·965, while the officinal is stated to be about ·980.

Ten specimens of Tinct. ferri chloridi, U. S. P., 1880, were obtained from leading pharmacists of Philadelphia. These answered to the tests for purity, but the specific gravities of all were found to vary between ·950 and ·970, except one, which was 1·005, and which proved to have been made with diluted alcohol instead of alcohol sp. gr. ·820.

To ascertain the amount of iron present in each, a solution of potassium permanganate was made, 3·14 gm. $K_2Mn_2O_8$, being dissolved in

1000 cc. distilled water. Theoretically, 1 cc. of this solution should be equivalent to 0·0056 gm. pure iron; but from a number of determinations made with pure iron wire, it was ascertained to be equal to 0·00537 gm. iron, and this number was employed as the "factor of correction."

To 5 gm. of the tincture weighed accurately, 3 gm. of metallic zinc, with dilute H_2SO_4 was added, and the mixture, heated, excluded from air until effervescence ceased. It was then cooled and quickly titrated with potassic permanganate solution, until a pink coloration of the liquid occurred. The number of cc. used was 52·1; multiplied with 0·00537, it indicated 0·279777 gm. iron; but from this number was subtracted 0·023896, the known amount of iron contained in the zinc as impurity, which gives 0·25588 gm. in 5 grams, or 5·1176 per cent. of iron present in the tincture; this is equal to 14·8357 per cent. of Fe_2Cl_6, and to 24·6395 per cent. of $Fe_2Cl_6.12H_2O$.

The following tables will show quite a variation in the amount of iron, etc., present, even when the specific gravities are the same. This can be easily explained by the variations in the specific gravities of the Liq. ferri chloridi and alcohol used.

Spec. grav.	Used 5 gm. of tincture.				Percentage in tincture of		
	$K_2Mn_2O_8$.	Total iron.	Iron in zinc.	Iron in tincture.	Iron.	Fe_2Cl_6.	$Fe_2Cl_6.12H_2O$.
	cc.						
·965	52·1	·279777	·023896	·25588	5·1176	14·8357	24·6395
·970	52·1	·279777	·023896	·25588	5·1176	14·8357	24·6395
·965	39·5	·212115	·023896	·188219	3·7642	10·9124	18·1137
·970	51·5	·276555	·023896	·252659	5·0532	14·6435	23·8367
·965	50·1	·269037	·023896	·245141	4·9028	14·218	23·6562
1·005	57·4	·308234	·040828	·25741	5·1482	14·9241	24·6405
·967	52·0	·279240	·023896	·25534	5·1068	14·8047	24·6405
·968	48·1	·258297	·023896	·2444	4·888	14·1704	23·5848
·960	48·6	·262982	·023896	·239086	4·7817	13·8062	23·0714
·960	53·3	·286221	·023896	·262325	5·2465	15·0936	25·3189

Attention was now directed to the action of sunlight on the tincture and aqueous solution of iron; for the latter, Liquor ferri chloridi 35 parts was mixed with distilled water 65 parts. The specific gravity of this solution was 1·100; it was of a yellowish-brown color, slightly lighter than the tincture. On analysis with potassic permanganate solution, the amount of iron, etc., present was found to be as follows:

	$K_2Mn_2O_8$.	Iron, total.	Iron in zinc.	Iron in liquid.	Percentage of		
					Iron.	Fe_2Cl_6.	$Fe_2Cl_6+12H_2O$.
	cc.						
Tincture, 5 gm	55·8	·209546	·023896	·27565	5·513	15·9807	26·6004
Aqueous solution, 5 gm.	47·7	·256049	·023896	·232153	4·64402	13·4639	21·4438
Liq. ferri chlo. (U. S. P.), 1·390, 2 gm.	53·8	·28929	·023896	·265394	13·2697	38·0511	63·334

Three specimens each of the alcoholic tinctures and aqueous solutions were then exposed to the action of the sun's rays for various lengths of time. The alcoholic tinctures were found to change to a greenish-brown or blackish-green color, according to the duration of exposure, from partial reduction to ferrous chloride, while in both color and composition the aqueous tincture remained unchanged. The appended table shows the amounts of ferrous salt reduced by the action of sunlight from the ferric state.

Exposure.	$K_2Mn_2O_8$.	Iron in ferrous state.	Iron in ferric state.	Per cent. of ferrous iron.
Tincture, 2 weeks	23·5	·126195	·149455	45·79
Tincture, 4 weeks	31·4	·168618	·107032	60·909
Tincture, 6 weeks	48·3	·259371	·016279	94·054
Aqueous solution, 2, 4, and 6 weeks	None.	None.	——	——

A specimen each of the alcoholic and aqueous solutions was exposed to the action of sunlight and air. On examination it was seen that the reducing action of the alcohol overcame, to a considerable extent, the oxidizing action of the air, as will be seen by the following table.

	No. cc. $K_2Mn_2O_8$ used.	Amount of ferrous iron present.	Amount of ferric iron present.	Per cent. of ferrous iron.
Alcoholic tincture exposed to sun and air eight weeks	32·5	·174528	·099370	63·5154

The aqueous solution was not affected in the least.

The theoretical amount and percentage of iron, etc., of the officinal solution and tincture is shown in the appended table:

	Amount of iron.	Per cent. of iron.	Per cent. of Fe_2Cl_6.	Per cent. of $Fe_2Cl_6.12K_2O$.
Liq. ferri chloridi in 2 gm.....	·2604	13·02	37·6878	68·8211
Tinct. ferri chloridi in 5 gm.....	·22820	4·564	13·2308	22·015

The estimations of the percentage strength of the officinal preparations were made from the gravimetric test of the Pharmacopœia, the accuracy of which has been shown to be doubtful. The percentage of anhydrous ferric chloride stated in the Pharmacopœia description of Liq. ferri chloridi is 37·8. As seen by the foregoing tables, the pharmacopœial solution and tincture contain less iron and iron salts than the commercial preparations, and also the preparations made for these experiments, although the pharmacopœial preparations are said to be of higher specific gravities.

Dr. Attfield strongly advocates the discarding of the alcohol in the tincture. He holds that it is unnecessary, expensive, and positively injurious. The only advantage claimed for its use is that it reacts with free acid to form chloric ether, which is believed, by some practitioners, to be of medicinal advantage. If chloric ether is desired, why not dissolve a specified amount in alcohol and, when so desired, add it to the aqueous tincture, which is not altered by light and air? In this way an expensive ingredient would be dispensed with and a known amount of ether obtained.

ON TINCTURA OPII DEODORATA.

By George W. Sloan.

Read before the Indianapolis Association of Pharmacists, July 11, 1883.

How does deodorized tincture of opium, prepared in accordance with the process suggested by R. Rother, compare with that of the Pharmacopœia?

In order to answer this question I have adopted the following method:

Taking a sample of the powdered opium at hand, my object was to ascertain the percentage of morphine present; this was done by following the directions given in the Pharmacopœia of the United States, Revision of 1880, which is briefly stated as follows: 7 grammes of powdered or other opium are well triturated with 3 grammes of fresh slaked lime and 70 cc. of distilled water during a half hour; then filter until 50 cc. have passed through the filter, and to this add stronger ether, 25 cc., alcohol, 5 cc., and ammonium chloride, 3 grammes, the mixture to be well shaken during the first half hour; allow to stand twelve (12) hours, decant the ethereal mixture, wash again with 10 cc. of ether and decant; collect the crystals of morphine upon a balanced filter, and after careful drying weigh the filter containing the crystals of morphine, multiply the weight in grammes by 20 and you have the percentage of morphine present in the opium. Pursuing this course the result obtained was 13·80 per cent.

Thus having a definite starting point, I prepared Tinctura Opii Deodorata in accordance with the process given by R. Rother, *Am. Jour. Pharmacy*, Feb. 1783, p. 76, viz.:

Take of Opium, dried and powdered		2½ troy ounces.
Vaseline, Spermaceti	*aa*	1 "
Alcohol		7 fluid ounces.
Water sufficient.		

Upon the opium contained in a suitable capsule pour 12 to 14 fluid ounces of water and boil the mixture ten or fifteen minutes; then add the spermaceti and vaseline, stir them well together, let the mixture cool and decant the liquid from the dregs. Upon the residue pour 8 fluid ounces of water, heat, stir well, and after cooling decant as before. Repeat this once more with 8 ounces of water, or sufficient

to make 25 fluidounces of the decantates; let the mixed liquid become cold, filter and add the alcohol.

The foregoing process was followed with the utmost care, and after completion, prior to adding the alcohol, a portion was treated with ether to ascertain if all the resinous principles of the opium had been removed by the fatty matters. After shaking well together and allowing to stand six hours there was no separation of any substance similar to that usual in the officinal process; in fact, the ether rested upon the surface of the opium solution with a clean and sharply-defined line; a portion of the ether was poured upon a piece of white blotting-paper and allowed to evaporate; there was no sign of stain or odor.

Of this tincture 105 cc., representing 7 grammes of opium, were evaporated to 25 cc., cooled, and water sufficient added to make 77 cc.; to this was added 3 grammes of fresh slaked lime, and the mixture was triturated during a half hour, the solution was filtered into a bottle until 50 cc. were collected representing 5 grammes of opium; this was then treated as described for the assay of opium in the United States Pharmacopœia.

Upon weighing the product I was astonished at the result, which was 7·10 per cent. of morphine. Being fearful that I had made an error in my work I called upon a competent assistant and asked him to go over it while I again repeated the examination—with the result of 6·90 and 6·85 respectively, the work being done entirely without any comparison until complete.

This result seems to my mind to give a feature of importance to this process that very probably has not been considered. I regret that I did not save the fatty substances, as they might have been examined for the missing morphine. The same opium, lime, ether and chloride of ammonium were used in each case.

SYRUPUS LACTUCARII.

By Nehemiah D. Streeter, Ph. G.

From an inaugural essay.

The following process will yield a very satisfactory preparation, having the same strength as that of the new Pharmacopœia:

Take of

Lactucarium	5 parts.
Ether	5 parts.
Alcohol	3 parts.
Sugar	65 parts.

Orange flower water and water, of each sufficient.

To the lactucarium contained in a flask or other vessel capable of being tightly closed, add the ether and macerate with occasional agitation for 24 hours, at the end of which time add 10 parts of water, and having shaken the flask well, distil off the ether by the immersion of the flask in hot water, heat being continued for a short time after the odor of ether has entirely disappeared; when cool add the alcohol and again macerate for twenty-four hours with frequent agitation. Then transfer the contents of the flask to a percolator, and when the liquid has ceased to pass, gradually pour on orange flower water, until 30 parts of percolate are obtained; set this portion aside and continue the percolation with water until the percolate passes tasteless, evaporate the last portion to five parts and add to the portion set aside. Filter the mixture and pass through the filter a sufficient quantity of orange flower water to make the filtrate weigh 35 parts. Having placed the sugar in a percolator pour upon it the menstruum, cover well and set aside that a syrup may be formed.

Thus prepared the syrup has a rather agreeable odor, is of a reddish brown or yellowish brown color, transparent, has a not unpleasant bitter taste, and is miscible in all proportions with water and alcohol, without becoming turbid. The exhausted residue left by the above treatment is of a light brown color, crummy between the fingers, odorless and tasteless, and when treated with dilute acids or weak alkalies undergoes no change.

By using water instead of orange flower water in the above process, the syrup will exactly represent that of the Pharmacopœia; but made as above it will have a more agreeable flavor.

SIZE OF DROPS.

By Professor Charles F. Himes, Ph.D., Carlisle, Pa.[1]

In the recent edition, the 15th, of the U. S. Dispensatory, among other modes of approximate measurement, in the administration of medicines given, is that by drops, and in calling attention to the conditions affecting the size of drops, the statement is made, that "the drops from a full bottle should be less than from one more or less emptied." There is no indication that the statement rests upon direct tests, and it is so decidedly at variance with the results of experiment,

[1] Reprint from the "Journal of the Franklin Institute," July, 1883, communicated by the author.

that it seems but proper that attention should be called to it. Other conditions remaining the same, drops diminish in size as the bottle is emptied, and to such a degree that any one can satisfy himself of the fact in a few minutes. The circumstance which first directed my attention to the subject will illustrate also the degree of variation in size. It was assigned to a student in the laboratory, as an exercise, to ascertain how far drops might be substituted for more precisely measured quantities of liquids in making comparative determinations for domestic or even commercial purposes. As a preliminary test of the degree of uniformity of results, the hardness of a constant quantity of the same sample of water was destroyed by dropping into it standard soap solution, from the same bottle, and the same portion of the lip. The number of drops of course varied, but, after some skill had been acquired in using the method, in a series of experiments, the number of drops reported as required, indicated regularly increasing hardness for four experiments, then a sudden diminution, succeeded by regular increase. Upon watching the procedure of the student, there seemed to be no condition varying with the same regularity except the amount of liquid in the bottle, and consequent size of the drops; and upon performing the experiments by filling the bottle up to the same mark for each trial, the previous periodicity disappeared, and the uniformity of results was greater than had been anticipated. Subsequent experiments with different bottles, and different liquids, demonstrated that the differences in size of drops occasioned by the variation in the amount of liquid in a bottle were not such as might in all cases be overlooked with prudence in the administration of medicines, and that the method of drops, untrustworthy at best, was rendered much more so from this fact. Upon reference to an older edition of the Dispensatory, on hand at that time, no allusion to the effect upon the size of the drops of the amount of liquid in the bottle was made, and it seemed hardly necessary to call attention to a fact presumably known to any who had employed the method.

Since sending the preceding hastily prepared note upon the size of drops I have taken the opportunity to run over the literature of the subject as given in the AMERICAN JOURNAL OF PHARMACY, not then at my command, and am surprised that, with the painstaking character of the investigation of the conditions affecting the size of drops, this one of the degree of fullness of the bottle is practically uninvestigated, and left among the undetermined conditions.

In 1830, Durand[1] called attention to a series of experiments by Dr. Shuttleworth, and their appreciation by the College of Physicians of London, and gave as the conclusion from experiments of his own, "that the practice of prescribing fluid medicines by drops is altogether objectionable," and that ignorance of the conditions affecting size of drops may lead to serious consequences. After summing up the usual conditions of density of liquid, cohesion of particles, shape of the mouth of the vessel, etc., he remarks, "besides, in every instance, the first drops poured from any vase are always smaller than those subsequently obtained." There is no indication whatever that he, in the most indirect manner, intends to allude to the condition of the bottle as to fullness, but simply to a fact, which the author has not verified, that the *few* drops *first passing* over the lip of the vessel are smaller than the subsequent ones.

In 1858, Bernoulli[2] gave results of investigations with great accuracy, "keeping in view the nature of the vessel, the temperature, the rapidity of dropping, and other circumstances calculated to affect the weight."

In 1860, Proctor[3] calls attention to the well-established variation in size of drops, with form and size of vessel, with density and viscosity of liquids, "and according to some other of its qualities not yet well understood."

In 1864, Quin, in the *Druggist and Chemist*,[4] prefaces an abstract of very careful and exhaustive investigations by Guthrie of the conditions affecting the size of drops by a remark upon "the difficulty of obtaining a standard drop, a difficulty which is still more increased by the knowledge that even when the same vessel and liquid are used the differences are almost as great as those already cited."

Parrish, on experimenting with ounce vials of water, found, in seven trials, the drops required for a fluidrachm to vary between thirty-two and sixty-five.

Guthrie investigates most fully "the physical relations existing between the matter on which the drop is formed, the liquid constituting the drop itself, and the medium through which it passes," a con-

[1] "American Journal of Pharmacy," vol. i, p. 165.

[2] "Schweizer. Zeitschr. f. Pharm.," 1858, pp. 97—100; AM. JOUR. PHAR., vol. xxxi, p. 441.

[3] "Lon. Pharm. Jour.," July 2, 1860; AM. PHARM. JOUR., vol. xxxii, p. 428.

[4] AM. JOUR. PHAR., vol. xxxvi, p. 522.

dition not clearly expressed before; but, after enumeration of the other usual conditions, as given by Guthrie, Quin remarks: "The condition, however, which has the greatest effect upon the size of the drop is the interval which takes place between the successive drops, and called by Prof. Guthrie the *growth-time*."

The careful experiments by Prof. Guthrie upon the influence of this condition are quoted, with his conclusion that, "on the whole, the law seems to be, the slower the dropping the smaller the drop." This was regarded as a most interesting fact to the pharmacist, as showing "the influence of rate in dispensing drops."

The paper of Prof. Guthrie is highly commended for its exhibition of talents and patience in investigation, and this "enormous and evidently most fruitful field" of investigation commended to him. But although growth-time may in some way be involved in the degree of fullness of the bottle, in not the remotest manner is the latter condition alluded to.

In an editorial of the AMERICAN JOURNAL OF PHARMACY, Feb., 1877, vol. 49, differences in size of drops, of from 30 to 100 per cent., from the same vessel, is remarked upon, and the experiments of Durand, before mentioned, are alluded to.

In 1880, Talbot[1] gives an account of experiments upon this subject, alludes to those of Durand and Bernoulli, and, in summing up his results, gives the opinion that "the administration of powerful medicines by drops is always dangerous," that "a single bottle is inconstant" as to size of drops, that "cohesion exerts the greatest influence upon the bulk of drops, temperature very little effect, and rapidity of dropping almost none,"—the last conclusion being at variance with that of Guthrie, previously given.

In none of these papers has the condition mentioned and illustrated in my note, been alluded to.

Ergot in Delirium Tremens.—Dr. Arnoldow (*Deutsche Medicinal-Zeitung*) relates the case of a man suffering from hæmoptysis, who was also threatened with delirium tremens. Chloral had been given for the sleeplessness, but without effect. Upon the administration of ergotin, not only did the hemorrhage cease, but the symptoms of alcoholism also subsided. This happy result induced the author to give ergot in several other cases of mania-a-potu, in all of which the delirium was speedily controlled. Dr. Arnoldow explains this action by the contraction of the blood-vessels of the brain induced by ergot.—*Amer. Med. Digest.*, March 15.

[1] AM. JOUR. PHAR., vol. lii, p. 337.

COMPARISON OF GALENICAL PREPARATIONS OF THE UNITED STATES AND GERMAN PHARMACOPŒIAS.

BY THE EDITOR.

(Continued from page 348.)

Elixir Aurantii, U. S. Elixir Aurantiorum compositum, *P. G.*—Dissolve oil of orange 1 part in sufficient of a mixture of alcohol 1 part and water 3 parts to obtain 200 parts and add sugar 100 parts. *U. S.*—Macerate orange peel 50 parts, cinnamon 10 parts, and potassium carbonate 2·5 parts, in sherry wine 250 parts; express and obtain 230 parts, in which dissolve 5 parts each of the extracts of gentian, wormwood, buckbean leaves and cascarilla. *P. G.* It will be observed that, notwithstanding the similarity of their names, the two preparations differ widely in composition and medical properties.

Emplastrum Hydrargyri.—Melt together olive oil and resin each 10 parts, rub with mercury 30 parts and add lead plaster 50 parts. *U. S.*—Rub mercury 100 with turpentine 50 parts, adding a little oil of turpentine, if necessary; then add lead plaster 300 parts and wax 50 parts. *P. G.*

Emplastrum Plumbi, U. S. Emplastrum Lithargyri, *P. G.*—Litharge 32 parts, olive oil 60 parts, water sufficient. *U. S.*—Litharge, common olive oil and lard equal parts, water sufficient. *P. G.*

Emplastrum Galbani, U. S. Emplastrum Lithargyri compositum, *P. G.*—Melt together galbanum 16 parts, turpentine 2 parts; strain, and add Burgundy pitch 6 parts and melted lead plaster 76 parts. *U. S.*—Melt together galbanum, ammoniac and turpentine each 10 parts, adding a little water, and strain; then add lead plaster 120 parts and yellow wax 15 parts, previously melted and somewhat cooled. *P. G.*

Emplastrum Saponis, U. S. Emplastrum saponatum, *P. G.*—Rub powdered soap (made of olive oil and soda) 10 parts with sufficient water and add to melted lead plaster 90 parts. *U. S.*—Rub powdered soap (made of olive oil and lard equal parts and soda) 1 part, camphor 1 part, with sufficient olive oil, and add to the melted and partly cooled mixture of lead plaster 70 parts and yellow wax 10 parts. *P. G.*

Extractum Aconiti.—Aconite root 100 parts, tartaric acid 1 part; exhaust with alcohol; the extract contains 5 per cent. of glycerin. *U. S.*—Aconite root exhausted with a mixture of alcohol 4 parts and

water 3 parts, the tincture evaporated to a thick extract. *P. G.* It should be remembered that the German Pharmacopœia directs the exhaustion of drugs to be effected by maceration and expression; in preparing extracts the second maceration is ordered with one-half the quantity of liquid used for the first one.

Extractum Aloes.—Dissolve aloes 1 part in boiling distilled water 10 parts, *U. S.*, 5 parts, *P. G.*; otherwise identical.

Extractum Belladonnæ alcoholicum, U. S. Extractum Belladonnæ, *P. G.*—Dry belladonna leaves are exhausted with a mixture of alcohol 2 parts and water 1 part, afterward with diluted alcohol; the extract contains 5 per cent. of glycerin. *U. S.*—This and other narcotic extracts are made according to Mohr's suggestion: the expressed juice from 10 parts of the herb is evaporated to 1 part, mixed with alcohol 1 part, filtered and evaporated to a thick extract. *P. G.*

Extractum Cannabis indicæ.—The two formulas are identical, except that the P. G. uses alcohol, sp. gr. ·832, and exhausts by maceration.

Extractum Cinchonæ, U. S. Extractum Chinæ aquosum, *P. G.*—Exhaust Calisaya bark with a mixture of alcohol 3 parts and water 1 part; the extract contains 5 per cent. of glycerin. *U. S.*—Exhaust by cold maceration with water any cinchona bark (cultivated), preferably from Cinchona succirubra containing at least 3·5 per cent. of cinchona alkaloids, and evaporate to a thin extract. *P. G.* There can be no doubt that the alkaloids are more thoroughly exhausted by the first process; but we believe that no assays have been made of the percentage of alkaloids contained in extracts prepared from the same bark with alcoholic and aqueous menstruums. The P. G. orders also an *Extractum Chinæ spirituosum*, prepared from the same quality of bark, but exhausted with alcohol, spec. grav. ·894, the tincture to be evaporated to dryness; it is more nearly a representative of the extract U. S. P. than the aqueous extract.

Extractum Colocynthidis.—Colocynth is freed from the seeds, coarsely powdered and exhausted with alcohol, sp. gr. ·928. *U. S.*—Colocynth fruit is exhausted by maceration, first with alcohol, sp. gr. ·894, afterwards with a mixture of equal weights of the same alcohol and water. *P. G.*—The seeds are not required to be removed; but, in case the fruit be bruised or ground, the extract will be contaminated with the weaker extract of the seeds. Both extracts are evaporated to dryness.

Extractum Cubebarum, P. G. Oleoresina Cubebæ, *U. S.*—Cubeb exhausted with stronger ether, *U. S.*, with a mixture of equal weights

of stronger ether and alcohol, *P. G.*, the last process yielding a brown oleoresin.

Extractum Digitalis is prepared like Extr. Bellad. alcoh., *U. S.*, and Extr. Bellad., *P. G.*

Extractum Ergotæ, U. S. Extractum Secalis cornuti, *P. G.*—Evaporate 5 parts of fluid extract of ergot (made with a mixture of alcohol 3 parts and water 4 parts, and containing about 5 per cent. of diluted hydrochloric acid to 1 part, at a temperature not exceeding 50°C. *U. S.*—Macerate ergot 10 parts with water, evaporate to 5 parts, add 5 parts of alcohol, spec. grav. ·894, after 3 days filter and evaporate to a thick extract; treat this twice with its own weight of alcohol, ·894; decant the liquid and warm the residuary thick extract to expel the alcohol; it yields a clear solution with water. *P. G.*

Extractum Filicis, P. G. Oleoresina Aspidii, *U. S.*—Exhaust male fern with stronger ether by pecolation, *U. S.*, by maceration, *P. G.*

Extractum Gentianæ.—Exhaust gentian with water by percolation, *U. S.*, by maceration, *P. G.*; boil, strain and evaporate to a pilular consistence, *U. S.*; evaporate to 2 parts, dilute with cold water, filter and evaporate to a thick extract., *P. G.*

Extractum Hyoscyami alcoholicum, U. S. Extractum Hyoscyami, *P. G.*—Prepared like extract of belladonna, except that the U. S. P. formula omits the glycerin.

Extractum Nucis vomicæ, U. S. Extractum Strychni, *P. G.*—Exhaust nux vomica with a mixture of alcohol 8 parts and water 1 part, and evaporate to a pilular consistence. *U. S.*—Digest nux vomica first with alcohol, spec. grav. ·894, and evaporate to dryness. *P. G.*

Extractum Opii.—Exhaust opium by maceration with water, and incorporate with the extract 5 per cent. of glycerin. *U. S.*—Exhaust powdered opium by maceration with water, and evaporate to a dry extract, which must at least contain 17 per cent. of morphine. *P. G.*

Extractum Quassiæ.—Jamaica quassia wood is exhausted with cold water, and the extract mixed with 5 per cent. of glycerin. *U. S.*—Surinam or Jamaica quassia wood, with the bark, is exhausted with boiling water, and the resulting extract evaporated to dryness. *P. G.*

Extractum Rhei.—Rhubarb is treated first with alcohol, afterwards with diluted alcohol; the extract is to be of pilular consistence. *U. S.*—Rhubarb is exhausted with a mixture of 2 parts of alcohol and 3 parts of water; the extract is to be dry. *P. G.*

Extractum Taraxaci.—The expressed juice of the root, gathered in

September, is evaporated at a low heat to a pilular consistence. *U. S.* —The root and herb, collected in spring and dried, 1 part, is exhausted by maceration with water, the infusion evaporated to 2 parts, diluted with cold water, filtered and evaporated to a thick extract. *P. G.*

PRACTICAL NOTES FROM VARIOUS SOURCES.

By the Editor.

Essential Oils and Distilled Waters.—Percy Wells recommends the addition of a small quantity of potassium permanganate to the water sufficient to make it a faint pink color, and states that volatile oils as well as medicated waters are thereby much improved in odor and quality. Even waters partly spoiled will, on being redistilled in this manner, recover their odor and not again change. ½ to 1 grain per ounce of oil will be sufficient.—*Phar. Jour. and Trans.*, May 12, 1883, p. 918.

Temperature of Ice Cream.—In a paper read before the Pennsylvania Pharmaceutical Association Mr. Gustavus Pile explains the fact that the seeming warmth of ice water as compared with ice cream is due to the considerable difference of temperature, that of ice cream being about 12°F., and if frozen good and hard, even as low as 8°F., while it is difficult to get the ice water even as low as the freezing point.

Chinoline and Chloral.—On mixing the two liquids O. Rhousso-poulos obtained a white insoluble butyraceous mass which could not be recrystallized. But on mixing the etherial solutions of the two compounds only very little of this mass is formed, while the filtrate, on evaporation, will yield white crystals which melt at 66°C., are decomposed by hot water, but may be recrystallized from benzol, and have the composition $C_{11}H_{10}NO_2Cl_3$ representing one molecule each of chloral, chinoline and water.—*Berichte*, 1883, p. 881.

Chinoline and Phenols.—K. Hock observed a rather considerable rise of temperature to take place on mixing chinoline and *phenol;* the liquid remained transparent, but the author was unable to obtain a well-defined definite compound. By combining with the aid of heat 2 molecules of chinoline with 1 mol. of resorcin a crystalline mass of *chinoline-resorcin* $C_{24}H_{20}N_2O_2$ is obtained, which may be recrystallized, is readily soluble in alcohol, ether and chloroform, insoluble in benzin, sparingly soluble in cold water and has a bitter somewhat acrid taste.

In a similar manner may *hydrochinone-chinoline* be obtained, which has similar properties, but like hydrochinone turns red when moist, on exposure to the air. Both compounds possess antiseptic and antipyretic qualities, and are being used in the hospital of Bern.—*Ibid.*, 885–887.

Phenoresorcin is the name given by F. Reverdin to a liquid prepared by melting together 67 parts of phenol with 33 parts of resorcin and adding 10 parts of water. This mixture remains liquid and is soluble in water in all proportions.—*Rundschau, Leitm.*, May 10, 1883; *La Ruche Phar.*

Granular Extractum Ferri pomatum has been observed by E. Mylius who found it to contain 17·94 per cent. of anhydrous ferrous succinate, of which salt 1·235 parts are soluble in 100 parts of water. It is probable that fermentation set in during the digestion of the apple juice with iron; at least Hager states that under this condition, an unsightly granular extract is obtained.—*Phar. Centralhalle*, May 31, 1883.

Tinctura Digitalis, which had been kept in a glass-stoppered bottle for about two years, had lost by evaporation about one ounce, and deposited a compact precipitate. This was microscopically examined by Dr. H. Stieren and consisted of chlorophyll, red-brown waxy extractive and of a yellowish, more or less crystalline substance, supposed to be digitalin. The precipitate was dissolved in one ounce of alcohol sp. gr. 0·88, filtered and mixed with the remaining 15 oz. of the tincture, the red-brown color of which being thus changed to the dark greenish-brown of the fresh tincture. Dr. Stieren directs particular attention to the partial separation of active principles, likely to occur with the deposition of precipitates in tinctures.—*D. Am. Apoth. Ztg.*, May, 1883, p. 122.

Permanent solution of ferrous iodide.—Izard recommends the addition of a few drops of alcohol to the preparation as soon as the iodine has been combined with the iron. He regards the production of aldehyd as likely to take place, in consequence of which the oxidation of the ferrous salt is prevented. *L'Union Pharm.*, May, 1883, p. 196; *Bull. Soc. Phar. Sud-Ouest.*

Tincture and fluid extract of Colombo.—G. W. Kennedy reported to the Pennsylvania Pharmaceutical Association, that the best menstruum for exhausting Colombo is a mixture composed of alcohol 70 parts,

glycerin and water each 15 parts; the percolation for the fluid extract is finished by a mixture of alcohol 7 and water 3 parts.

Fluid Extract of Ipecacuanha.—In a paper read before the Pennsylvania Pharmaceutical Association, J. A. Weaver states that, having had uniform good results in preparing syrup of ipecac by the formula of Mr. J. B. Moore ("Amer. Jour. Phar.," 1870, page 129), he prepared the fluid extract by essentially the same formula, preserving the preparation by one-fourth volume each of glycerin and alcohol. This fluid extract, mixed with simple syrup, yielded a syrup which was perfectly clear, and remained so for several weeks, when it separated a deposit, which, however, is redissolved (suspended) on shaking. The author thinks that the fluid extract of the present pharmacopœial process would have the same objection, and that, therefore, only small quantities of the syrup should be made at a time.

Fluid Extract of Vanilla.—Another modification of the formulas heretofore published in this journal (1854, p. 300, 1872, p. 63, 1876, p. 342, 1882, pp. 65 and 281) is suggested by J. F. Patton in a paper read before the Pennsylvania Pharmaceutical Association: Reduce 8 troyounces of vanilla bean to a moderately fine powder with the aid of 8 troyounces of sugar, add 2 pints of deodorized alcohol, macerate for 30 or 60 days, then add a mixture of 3½ pints of deodorized alcohol and 2½ pints of water, again macerate for 30 days and filter. Extract of vanilla made by this simple process, like wine, improves with age.

Administration of Aspidospermine.—Eulenberg, in the "Medicinal-Kalender" for 1883, gives the following formula for administering the active principle of quebracho, which, it has been claimed, may be used with benefit in all forms of dyspnœa without regard to the cause: ℞ Aspidospermine, 1 gm. (gr. xv.); aquæ destillatæ, 50 gms. (f℥iss); acidi sulphurici, q. s. ad solut. M. Dose, 1 gram (15 minims), containing 2 centigrams (gr. ⅓) of the remedy, or more.—*Le Progrès Médical; Amer. Med. Digest,* March 15.

Iron Koumys—Dr. Ebermann, Petersburg, has a factory in Farskor Iselo, where he manufactures "Iron Koumys." To each bottle, about 1 liter (33 ounces), he puts 5 to 10 grains ferrum lacticum, which dissolves very easily by shaking, and does not make the taste disagreeable. Anemic patients use two or three bottles every day, and it is agreeable to the stomach. The effect is very good, and he recommends the use of "Iron Koumys in cases where iron powder or iron pills"

cannot be used. — *Berliner Medizinal Zeitung; Minnesota Med. Mirror.*

Medicated Gelatin, in local treatment of skin diseases, is highly spoken of by Prof. Pick, of Prague ("Wien. Med. Zeit.") The gelatin is dissolved in double its weight of distilled water, in a bath, and the desired medicine stirred in. This is cooled in any convenient shape. The patient is instructed to melt a piece of this in a saucer set in hot water and apply with a brush to the diseased surface. After this is dry it should be occasionally painted with a thin coat of glycerin, which prevents its getting too dry and peeling off, and also makes it flexible, so that motion at the joints is not prevented. It is a most clean and convenient dressing, and should come rapidly into favor. It is easily removed in the warm bath.— *Weekly Med. Rev.*, May 12, 1883.

Unguentum plumbi, made with benzoinated lard, according to E. Dietrich, keeps unaltered for many weeks after the ointment made with fresh lard has become discolored.—*Phar. Post*, 1883, No. 20.

This ointment is similar to, but weaker and softer than the cerat. plumbi subacet., *U. S.* (see July number, p. 347). That benzoinated lard will prevent this preparation from becoming rancid was stated in this journal, 1873, p. 86, where a formula for it by Mr. A. P. Brown is published. This was again recommended in the volume for 1875, p. 386. At that time yellow wax was one of the ingredients; the fresh cerate being colored, it was soon ascertained that the surface became white from the formation of lead carbonate, and it became evident that, while the fatty base was preserved by the benzoin, the lead salt was decomposed by the carbonic acid of the atmosphere. The new U. S. Pharmacopœia very properly gives a process for the extemporaneous preparation of this well-known and much-used remedy.

THE PTOMAINES (CADAVER POISONS) BEFORE THE TRIBUNALS.

By L. Garnier.

Translated from Annales d'Hygiène through the Journ. de Pharm. et de Chim., Tome vii, 1883, *pp.* 377–382, *by Dr. Fred. B. Power.*

The question of the ptomaines being the order of the day, and the discussion to which it has previously given place being reproduced in every case of fatal poisoning by a vegetable product, we propose to treat the subject here from a more extended point of view, entirely general,

and to show that if the experts must always expect, from the production by dead bodies of these alkaloids, to meet with arguments which are often specially contrary to their conclusions, they can happily settle the difficulty in the majority of cases, and establish, by a summary of peremptory proofs, the existence of vegetable poisons administered with criminal intention.

The ptomaines are substances which are most frequently amorphous, oxygenated or non-oxygenated, fixed or volatile, of an alkaline nature, which form with acids crystalline salts, and show a deportment in their general properties like that of the alkaloids of vegetable origin. Like the latter they precipitate certain reagents, and like them they exercise, especially when in the free state, an action which is in general toxic upon the animal economy, with the manifestation of certain symptoms, among which predominate: dilatation of the pupil with consecutive contraction, sometimes convulsions often followed by muscular flaccidity, a diminution of activity of the heart, the loss of cutaneous sensibility and of muscular contractility even under electrical excitement, which is not produced by any vegetable poison (Corona), with the exception of muscarine (Gautier). They differ from the vegetable alkaloids and from certain natural toxic substances by the instantaneous reduction of ferricyanide of potassium, with the production of Prussian blue after the addition of ferric chloride; but this reaction is not absolutely characteristic of them, as certain alkaloids, not a large number, it is true, morphine, veratrine, apomorphine, hyoscyamine and muscarine, give the same result. However, in the absence of the above-mentioned poisons, this reaction, studied by Brouardel and Boutmy, retains its practical value.

The name of ptomaine, which has been assigned to these compounds by Selmi, proceeds from the fact that the larger number of them are volatile or of great alterability, at first in contact with the air disengaging various odors, urinous, cadaverous or virous; but especially under the influence of acid reagents, they develop, on the contrary, agreablee odors, recalling those of orange flowers, musk, and hawthorn.

These substances are produced by the putrefaction of nitrogenized organic materials, and must consequently appear in cadavers more or less rapidly after death, according to exterior circumstances; thus cold is one of the agents which best opposes their production. This origin from dead bodies has been known from most ancient times; but it results from the researches of G. Pouchet, A. Gautier and Etard that

the ptomaines are met with, in a minimum proportion it is true, in the different liquids and humors of the normal economy, blood, bile, saliva, urine, and muscular juice, and Gautier believes to be able to attribute the appearance of certain functional difficulties, as for example the epileptic symptoms of uræmia, either to an insufficient elimination of these principles thus regarded as necessary waste products of living cells, or to an exaggeration of their formation which then becomes pathological. He has likewise observed bonds of relationship sufficiently intimate between these poisons and the toxic principles of the venom secreted by some species of animals, serpents or others, or those poisonous fungi and especially muscarine, which, moreover, has been obtained by the oxidation of neurine from the yolk of egg, isomeric with the neurine of nerve tissue and with the choline of the bile.

In the numerous works relating to the ptomaines, indications are nowhere to be found of the quantity of animal poison which a definite weight of organic material in a state of putrefaction is capable of producing; and it appears constant, at least our personal researches authorize us to believe, that their production always takes place in an infinitesimal quantity compared with that of the material of their origin.

In accordance with their deportment in the presence of the reagents employed for distinguishing the vegetable alkaloids from each other, the ptomaines appear to be multiples, and to vary in their nature with the time of their appearance after death. But their physical form which appears, at least up to the present time, to be amorphous, or in every case not distinctly crystallized (R. Maly, in his journal, speaks of a residue having a crystalline aspect, but does not indicate at all whether these crystals are definable), has not permitted of their direct purification, and it was only in operating upon crystallizable salts, chlorides, carbonates and sulphates, that A. Gautier and Etard have succeeded in preparing two in a sufficient state of purity for permitting a precise study. The ptomaines obtained in each particular case have also special chemical characters, even though they be less distinctly determined, and if there is a certain exaggeration in the pretension of identifying a ptomaine with another product recovered under different circumstances.

It is a fact which is constantly verified in practice, and which may be a source of disappointment for the expert charged with a medico-legal investigation; that is, the extreme difficulty which is experienced

in separating the true alkaloids from the ptomaines, with which one must expect to see them associated when, in a case of poisoning, the chemical analysis is not proceeded with immediately, that is to say, from 24 to 48 hours after death. Notwithstanding the employment of the successive solvents indicated in the method of Dragendorff, and the ultimate transformation of the extracts into crystallizable salts, the alkaloids are always obtained more or less mixed with ptomaines, and consequently afford the reaction of Prussian blue. And as to this character there may be added others which are common to certain ptomaines and to certain vegetable alkaloids, one can conceive the embarassment in which the chemist finds himself precipitated if he does not take the pains to determine, without a single exception, all the properties of the isolated body, and to compare the results obtained with the reactions indicated for the substance which he believes to have in hand. It is only under the conditions of most scrupulous work, pushed to the extreme, that one is able to avoid confusion; and to demonstrate how great the causes of error may be, the following case, as signalized by Brouardel and Boutmy may be cited.

These distinguished chemists have abstracted from the cadaver of a drowned person, which had reposed 18 months under water, a fixed alkaloid of animal origin, presenting all the chemical and physiological reactions of veratrine, and, largely diluted, that of Prussian blue. Admitting that there had been intoxication by veratrine, how was it possible to arrive at a distinction between the veratrine and the animal alkaloid with which it may have been mixed, otherwise than by the crystallization of the base and the exact determination of its crystalline form. One could have likewise ascertained if, after the hypodermic injection of the isolated poison, the muscular excitement by the induction current persisted; but if the proportion of the ptomaine had been larger than that of the veratrine, this character would be found to be forcibly masked in consequence of this relative excess.

It appears equally difficult to distinguish morphine from a ptomaine; both of them reduce the ferricyanide of potassium, and produce physiological symptoms among which those of poisoning by the acrid narcotics predominate; but happily Fröhde's reagent and ferric chloride will permit of recognizing morphine, and the physiological experiment will show that morphine only produces death slowly, with a large dose, in stupefying the animal, and leaves the muscles sensitive to electric excitement; but here still the preceding objection may be

raised, as made upon the latter point with regard to veratrine. Happily, and this is a point upon which we have already insisted, the production of the ptomaines, although commencing a very short time after death, does not attain to but a very small quantity, which, if in most cases sufficient to admit of its characterization, is not capable of influencing the special reactions of the vegetable poison, except within very restricted limits.

There is, however, a case where an error will be more difficult to avoid, at least from a theoretical point of view: it is that when besides a certain quantity of a ptomaine only traces of an alkaloid are found, which was the cause of death; the case, for example, of poisoning by a minimum dose of strychnine, and that the toxicological research is made several months afterward. Under these conditions the development of the ptomaines will be advanced, and if it be true that the strychnine gradually disappears in the tissues of the poisoned animals, which, moreover, with Dragendorff, we place in doubt, one conceives that the characters of the trace of isolated strychnine may be completely concealed by those of the predominating ptomaine, and notably the blue-violet coloration which it gives with potassium bichromate and sulphuric acid, a coloration which quickly disappears, concealed by the brown and then green coloration which is produced under the same conditions by the ptomaine and the impurities which are always mixed with the isolated toxic substance.

But the situation will no longer be the same if the expert examination is made a short time after death; and under these conditions on the one hand the development of the cadaver alkaloids will be but slightly advanced, and on the other the poison sought for will not have become subjected to alteration. If one thus arrives at the isolation of a certain proportion of crystallizable alkaloid in the free state, and presenting a perfect accordance in physical, chemical and physiological properties with a vegetable poison, one will have the right to conclude as to the presence of the alkaloid which presents these properties, especially if one recalls the fact that, notwithstanding the assertion of a certain advocate, the physiological reaction accompanied by a miographic study is decisive, and that the persistence of sensitiveness of the muscle to the induction current is a reaction foreign to the ptomaines.

From that which precedes it results that, if in certain cases the difficulties of the expert examination may be great, they are not insur-

mountable, and that it is of importance to complete and render more precise the study of the ptomaines.

NOTE.—Those interested in the study of the putrefaction alkaloids will find two valuable contributions relating to their formation and chemical composition in the "Berichte der Deutsch. Chem. Ges.," 1883, pp. 1186–1195, entitled "Zur Kenntniss der Fäulnissalkaloïde" (a contribution to the knowledge of the putrefaction alkaloids), by L. Brieger, and "Ueber basische Fäulnissprodukte" (on basic putrefaction products), by E. and H. Salkowski.—F. B. P.

THE UNITED STATES PHARMACOPŒIA PROCESS FOR THE ESTIMATION OF HYDROCYANIC ACID.[1]

BY R. A. CRIPPS.

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The directions given in the United States Pharmacopœia for the estimation of hydrocyanic acid are as follows: "13·5 grams of diluted hydrocyanic acid, diluted with 30 cc. of water, and mixed with enough aqueous suspension of magnesia to make the mixture quite opaque, and afterwards with a few drops of solution of chromate of potassium, should require 50 cc. of the volumetric solution of nitrate of silver, before the red color, caused by the latter ceases to disappear on stirring (corresponding to the presence of 2 per cent. of absolute hydrocyanic acid)." On reading this I was struck by the small amount of solution of nitrate of silver required, and on calculating the amount theoretically required to precipitate the whole of the hydrocyanic acid as cyanide of silver found it to be 100 cc. instead of 50 cc. *Assuming* the formation of a double salt of cyanide of silver and cyanide of magnesium of the formula $MgCy_2(AgCy)_2$, and *assuming* also that chromate of silver will be precipitated as soon as the double salt is completely formed, then the figures given in the U. S. Pharmacopœia would be correct.

The object of the experiments shortly detailed in this note was to prove, first, whether or no the U. S. Pharmacopœia is correct in assuming that chromate of potassium will indicate the complete formation of double cyanide of magnesium and silver (if such exist), in the estimation of hydrocyanic acid, or whether it will only indicate the precipitation of the whole of the cyanogen as cyanide of silver; and second,

[1] Read before the School of Pharmacy Students' Association.

whether a double cyanide of magnesium and silver really does exist, and if so, what is its composition?

To determine the first point—(1.) 2·8402 grams of a sample of dilute hydrocyanic acid was estimated by the B.P. process (Dr. Senier's modification), and required 4·7 cc. of the vol. solution of nitrate of silver, indicating nearly ·9 per cent. of absolute HCy. (2.) 2·4446 grams of the same sample were then estimated by the U.S.P. method, and required 8·25 cc., indicating 1·82 per cent. admitting the assumption before mentioned, or ·91 per cent if (as is evident from the figures) the whole of the cyanogen is precipitated as AgCy, before any silver chromate is permanently formed, agreeing to about ·01 per cent. with the B.P. process.

The same experiment was repeated with the same result, proving conclusively that chromate of potassium will not serve as an indicator on the basis of the figures mentioned in the U. S. Pharmacopœia.

To prove the existence of a double cyanide of silver and magnesium, no mention being made of a double cyanide of magnesium and silver, either in Gmelin's "Chemistry," Watt's "Dictionary" or the leading English and American chemical journals, I made a few rough experiments to determine the existence of such a compound. (1.) Calcined magnesia was shaken with hydrocyanic acid until alkaline to test-paper, filtered, a little chromate of potassium added, and solution of nitrate of silver run in, in small quantities at a time; the precipitate at first formed was re-dissolved, showing that either a double cyanide was formed or that cyanide of silver is soluble in solution of nitrate of magnesium, which latter was disproved by the addition of more nitrate of silver, when white cyanide of silver was precipitated, until the whole of the cyanogen was converted into silver cyanide, when red chromate of silver was formed. (2.) Having thus proved the existence of a double salt I attempted to determine its composition by repeating the above experiment quantitatively, noting the number of cc. of nitrate of silver solution required to give a cloudiness from the precipitation of silver cyanide, and also the number required to completely precipitate the cyanogen (indicated by the formation of red chromate of silver).

Quantity of hydrocyanic acid used.....	2·5688 grams.
Quantity of st. sol. of $AgNO_3$ required to give cloudiness, from precipitation of AgCy.....	5·64 cc.
Quantity of st. sol. of $AgNO_3$ required to *completely* precipitate the AgCy.....	11·24 cc.

Corresponding to—

Real hydrocyanic acid	·030348 of a gram.
HCy required to form AgCy in double salt	·015217 of a gram.
HCy left in combination with Mg in double salt	·015131 of a gram.
Silver required to form double salt	·0607 of a gram.

Thus agreeing within the limit of experimental error with the formula $MgCy_2(AgCy)_2$.

The salt was prepared in filamentous crystals by filling an ordinary vial with hydrocyanic acid, adding excess of calcined magnesia, securely corking and heating in a water-bath for about twenty minutes, filtering and dissolving in the filtrate cyanide of silver until saturated, again filtering and evaporating over sulphuric acid.

From these experiments the following conclusions have been drawn:

1st. That the United States Pharmacopœia is at fault in the directions given for the estimation of hydrocyanic acid, arising from a false assumption, viz.: that chromate of potassium will indicate the complete formation of double cyanide of silver and magnesium.

2d. That in order to use this method for the practical estimation of hydrocyanic acid, the clause "should require 50 cc. of the volumetric solution of nitrate of silver in the U. S. P. must be read, "should require 100 cc. of the volumetric solution of nitrate of silver."

3d. That the method is not so satisfactory as that in vogue in this country; for if it be carried on till the formation of red chromate of silver, double the amount of silver solution will be required, and if it be filtered before estimation, the length of time required for complete union of MgO with the HCy, and for filtration and washing, would generally exclude the method from use.

4th. That a double cyanide of magnesium and silver does exist, having the formula $MgCy_2(AgCy)_2$, analogous to that of silver and sodium NaCy,AgCy.

Since writing the above I find that the U. S. Pharmacopœia in another place states that 1 cc. of solution of nitrate of silver is equivalent to ·0054 of a gram of HCy, which is also incorrect, being also based upon the assumption that chromate of potassium will indicate the complete formation of a double salt. The correct statement would be, that 1 cc. of decinormal solution of nitrate of silver is equivalent to ·0027 of a gram of real HCy as shown by the following equations.

$$HCN + AgNO_3 = AgCN + HNO_3;$$

or with the addition of magnesia—

$$2HCy + MgO = MgCy_2 + OH_2$$
$$MgCy_2 + 2AgNO_3 = 2AgCy + Mg(NO_3)_2$$

That is to say, 2·7 grams of hydrocyanic acid are equivalent to 1000 cc. of decinormal solution of nitrate of silver, and therefore ·0027 of a gram equals 1 cc.—*Pharm. Jour. and Trans.*, May 18, 1883, p. 917.

NOTE ON THE ABOVE PAPER.—Mr. Cripps' deductions are essentially correct, although some statements contained in his concluding remarks require slight modification. The method adopted by the U. S. Pharmacopœia for the estimation of diluted hydrocyanic acid is the same as that of the new Pharmacopœa Germanica for the estimation of hydrocyanic acid in bitter almond water, with the exception that while in the latter the factors are correctly stated, the U. S. P. has inadvertently erred in stating that 50 cc. of the volumetric solution of nitrate of silver should be required. With the employment of chromate of potassium as an indicator all the cyanogen of the acid will become converted into cyanide of silver before the red color of chromate of silver remains permanent. The amount of nitrate of silver solution required in the application of the Pharmacopœia test will therefore be 100 *cubic centimeters*, instead of 50 cc., or by the use of half of the stated amount of diluted hydrocyanic acid (6·75 grams, instead of 13·5 grams) the subsequent text may remain unaltered.

Mr. Cripps assumes, under his fourth conclusion, "that the statement of the U. S. P. (p. 397) that 1 cubic centimeter of solution of nitrate of silver is equal to 0·0054 gram HCN is also incorrect, and that this statement is also based upon the assumption that chromate of potassium will indicate the complete formation of a double salt." The factor 0·0054, as stated by the U. S. P. *is correct*, with evident reference to the original method of Liebig for the estimation of cyanides, whereby but half of the cyanogen present in the compound is indicated by the amount of nitrate of silver solution employed, the other half remaining in combination with the alkali in the form of a soluble double salt; for the purpose of calculation, therefore, either the number of cubic centimeters of the nitrate of silver solution employed must be doubled, or as the Pharmacopœia has quite as correctly expressed it, the factors derived from the molecular weights of hydrocyanic acid and cyanide of potassium must be doubled in order to represent (by Liebig's method) the amount of hydrocyanic acid or cyanide actually present.

That the above statement of the Pharmacopœia is not based upon a false assumption, as Mr. Cripps concludes, is evident from the text relating to the estimation of cyanide of potassium (p. 266), where the original method of Liebig is employed and the quantities are correctly stated in accordance with the factors given on page 397. F. B. POWER.

THE CULTIVATION OF THE POPPY IN EUROPEAN TURKEY.

The following is a translation of instructions as to the cultivation of the poppy and the method of extracting and preparing opium, which have been drawn up under the authority of the Turkish Government, and distributed throughout the agricultural districts of Macedonia, with a view to promote the development of the opium industry in that province:

"If we take into consideration the fact that poppy seed is capable of yielding 6 okes (22½ lbs.)[1] of opium and 10 kilos of seed to every dunum (100 sq. metres) of land sown; that an oke of opium realizes 400 pias (£3 12*s*), and a kilogram of poppy seed 40 pias, and therefore that altogether a dunum of land sown with poppy seed may be worth as much as 2,640 pias (£23 15*s*); if at the same time we bear in mind that a dunum of land sown with wheat seed yields at most 10 kilos of wheat and 2,000 okes of straw, and that with wheat realizing 25 pias the kilogram, and with straw being only worth 30 pias per 200 okes, the total possible value of a dunum of land sown with wheat is 280 pias (£2 10*s*.), we see at once that in comparison with wheat and other similar products the cultivation of the opium poppy is a most lucrative industry.

"Seeing then how productive of wealth the cultivation of the opium poppy has been to the agricultural population of the sandjak of Broussa the following is a short treatise supplying information on this point.

"*The Various Species of Poppy Seed and the Proper Season for Sowing.*—Poppy seed is also sometimes styled 'Khashkash' seed. It is very small and it is of two kinds. One is white and the other is of a darker hue, both being contained within shells or pods, which are sometimes termed cocoons. These cocoons are globular in shape, and of the size of a Jerusalem artichoke, having on the upper side a roundish mark which is termed the 'comb.'

The darker-hued seed is of two species. The outer shells or cocoons of the first species are small, and may be distinguished by a row of small holes, through which, if great attention be not paid, as soon as the outer shells are fully matured and ready to receive the produce of the seed the latter drops and is lost. The flowers of this first species

[1] The figures between parentheses are inserted as approximately correct.—Ed. Ph. J.

are generally of a red or purple hue. So also are the flowers of the second species; but the outer shells of the latter are larger and of an oval shape, and they have no holes in their combs.

"The white poppy seed is also of two kinds, of which though one is white the other is yellow. In other respects there is very little difference between these two kinds, both having large oval-shaped outer shells, with no holes under their combs, the flower, like the seed, being white. The opium extracted from this species of poppy is more abundant and of a superior quality to that which is the produce of the first-named species.

"Although in some localities the 'Khashkash' or poppy seed is sown, as a rule it is only utilized by yielding an oil which is extracted from it. From 100 okes (275 lbs.) of seed may be obtained a yield of 30 or 40 okes (82½ or 110 lbs.) of oil, which is of two kinds, of which one is obtained by first pounding the seed, then heating it and extracting the juice while the seed is still hot. This oil is used in Europe in the composition of water-color paint and oil paint, and is also burnt in lamps. It is also used in the manufacture of glass shades.

"The other kind of oil is obtained without heating the crushed seed, and having a pleasant taste, is used in the preparation of food.

"Arkara-Hissar Sahib ('Afion Kara Hissar').—The seed is first heated before the oil is extracted, which is then universally used by the inhabitants in the preparation of food.

"The oil extracted from the yellow poppy seed, like the opium so extracted, is of a superior quality to the others. In localities where there is no hoar frost in spring and autumn, poppy seed is sown from the month of September up to March; but in places where there is hoar frost the seed must without fail be sown in the month of September and in the spring after the chilly weather is passed. However, seeing that in most places there is hoar frost both in spring and autumn, and that in spring, even in the month of April, there is usually some hoar frost, and that after the month of April seed time is already passed, in this country the seed should be sown in September, or at latest in the beginning of October; if the seed be sown at the season mentioned the yield both of opium and of poppy seed is more plentiful than if that operation be performed when the weather is chilly.

"*Description of the Kind of Soil most suitable to the Poppy.*—The poppy seed must be sown in light, rich and yielding soils. If it be

sown in cold clayey soil or in damp localities the yield will be small and the opium of an inferior quality.

"Ground which is to be sown with poppy seed, of whatever kind it be (*i. e.*, the seed), should be well-manured, sheep's dung being of course preferable. Experience has proved that if a field which has just yielded a crop of opium be immediately sown with wheat, the crop resulting from this last sowing will be remarkably good.

"*The Method to be adopted in Sowing and the necessary subsequent Treatment.*—The soil of a field which is to be sown with poppy seed should be ploughed two or three times and well turned up. The seed should then be scattered about with the hand, just as flax seed is. After this the soil must be thoroughly stirred up and mixed by a rake or a row of bushes bound to the back of a harrow.

If 100 drachms (*i. e.*, Turkish drachms) of poppy seed be sown on every dunum of land, or on such an extent of land as will take a kilogram of wheat seed, it is sufficient. As soon as ever the young poppy plants begin to appear above the surface of the soil and to bear three or four leaves, in those places where they are too close together they must be taken up and planted again in such a manner as to leave a space of a span between each plant. In order to remove any weeds that may make their appearance in these spaces the soil must be hoed once or twice. This use of the hoe must never be omitted, for if there be many weeds in the field they stunt the proper and healthy growth of the plants, and cause a considerable diminution in the amount of the crop. Moreover, if the seeds of such weeds remain in the soil it becomes subsequently impossible to rid the field altogether of them.

"*The course of treatment to be observed at Harvest Time.*—Opium being a substance which is extracted from the pods or outer shells described above, as soon as these pods become green in color and have reached their full growth the green hue changes to yellow. A few days before this change of color takes place there forms over the pods a very thin watery film of a light-green hue, though somewhat indistinct in appearance. This film is called 'cougak.' If it be wiped away with the finger its place remains quite visible. If at about this time the pod be squeezed between the thumb and forefinger, it becomes so far strengthened that it cannot be easily crushed. It is then that the juice which forms the opium must be gathered.

"In order to gather the juice or paste, the first step is to take a knife made especially for this purpose, being small and as sharp-pointed as

the end of a penknife, and with it to cut a semi-circular line in the pod beginning from the middle and going round the edges, at the same time leaving a space of about a finger's breadth. Immediately after this is done there appears a white milk-like fluid of a bitter taste, and there forms. This fluid little by little increases in consistency, and its color becomes darker and darker, until in twenty-four hours it becomes coffee-colored and as thick as paste. This is opium. This must be scraped off with the edge of a somewhat large and blunt knife and put into a poppy leaf, and so on until as much as 20 or 30 drachms of opium have been collected on one leaf, the edges of which must be turned in so as to prevent its being spilled. If, while the opium is being collected, the film above described be mixed with it, it has a beneficial effect.

"At Karahissar the work of cutting lines in the pods of the poppies is generally begun early in the afternoon and continued until night-fall. As the opium must be collected twenty-four hours after the above operation has been concluded, the following day also, soon after twelve o'clock, they begin on the one hand to collect the opium from the pods which were cut the day before, and also to cut lines in other pods, which work occupies them until the evening. But should they come across pods which are not quite ripe, they leave them alone, and five or six days afterwards they again visit them, and after cutting lines in them collect their juice.

In order that the exact season for collecting the juice may not be missed, the whole work must be gone through and finished in five or ten days. Moreover, the proper time for marking the pods must be accurately ascertained, for if the pods be cut say ten days before or after they are quite ripe, there is no yield of opium. As an instance of this it may be mentioned that in the plain of Broussa the experiment was made. Although the plants had reached their full growth, the pods were marked or cut both before and after the exact time when the operation should have been performed, and consequently there was no yield of opium. Sometimes it happens that a dry wind begins to blow at the very time when the poppy pods should be cut, and the atmosphere becomes chilly in consequence. During such weather the yield of opium is very small. The pods also should not be cut when it is raining, for the rain washes away and destroys the juice as fast as it exudes from the seams that have been cut for it.

After the opium crop has been gathered in, the pods change their previous hue of either green or yellow to rose color; when this change

takes place the poppy plants should be taken up by the roots one by one and collected into small bundles. Each bundle should then be bound by a young green withe, and then so placed upright in the ground that the roots of the plants be covered, in which position they should remain for a few days until the seed contained within the pods shall have become thoroughly matured and dry. Then the pods should be threshed with a stick until they break open, when the seed may be collected.

"Another method is to sever the stem of the plant at the knot which is to be found close up to the pod, with the finger and thumb, and after collecting the ends so severed to spread them out to dry in some open place, and then to break them open by threshing, or else to pull them to pieces, and, after sifting the seed until it is quite free from extraneous matter, to collect it.

"At Karahissar they purposely burn most of the pods and reduce them to ashes, a fluid extracted from which they use to bleach cotton, on the ground that it is more effective than the water strained off from ordinary ashes.

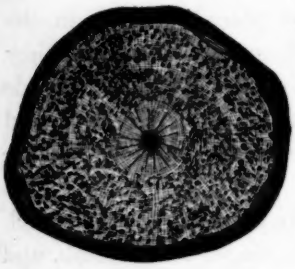
"After extracting the oil from the poppy seed, there remains a sediment technically called 'kyusebe," on which buffalo, cows, and black kine generally are fed, on the ground that such diet increases the amount of milk, and so of 'caimak' (cream)."—*Phar. Jour. and Trans.* May 18, 1883, p. 918.

GLEANINGS IN MATERIA MEDICA.

By The Editor.

Gouania domingensis, Lin.; Chewstick.—The cylindrical stems are 8 to 16 mm. ($\frac{1}{3}$ to $\frac{2}{3}$ inch) thick; the dingy grey-brown bark is 1 mm. ($\frac{1}{25}$ inch) thick, longitudinally wrinkled and with difficulty separated from the wood. The very thin cork consists of somewhat flattened cells, with mostly the inner wall thickened and containing a red-brown mass. The middle bark contains chlorophyll, and in many cells single monoclynic crystals of calcium oxalate, the primary bast bundles in small groups, the fibres broad, usually roundish and with distinct layers, occasionally groups of small, lemon-yellow stone cells inclosing crystals. The inner bark consists of extended bast bundles divided by the delicately-celled medullary rays and surrounded by rows of crystal cells. The bast fibres are long, thin, and characterized by the sharply-

defined primary membrane. The sieve tubes in the inner layer are prominent from their large apertures, and in the older layers appear shrunken in branching cords forming the so-called horn bast. The joints of the sieve tubes are about ·4 mm. long and have the transverse membrane horizontal, coarsely porous, and mostly covered with thick callus. The bark is free from starch.



Chewstick, magnified 3 diameters.

Zinc chloride with iodine imparts a violet color to the entire primary bast fibres, and with considerable swelling to the secondary layers of the secondary bast fibres and to the sieve-tube walls. All other cell membranes are colored yellow, and the contents of tangential groups of parenchyma cells in the soft bast brown. These contents are insoluble in cold water and potassa solution, almost completely soluble in boiling water, and are colored black by ferric salts. Other parts of the bark are free from tannin. The bast parenchyma is thin walled; the cells of the medullary rays become sclerotic only in old stems.

The wood is in circular layers, the early ducts of each year often larger, the several layers varying in thickness, occasionally rather compact, frequently very porous, the wood cells not numerous. The ducts are usually imbedded in parenchyma, appear transversely round or roundish, are sometimes ·3 mm. in diameters and upon the walls dotted. The parenchyma contains rows of crystal cells; the pith has the cell walls somewhat thickened and contains scattered crystals.

The bark has a bitter taste. The yellow coloring matter is contained in the membrane, and yields with hot water a tasteless solution which does not react with ferric chloride or alkalies.—*Phar. Centralhalle*, 1883, No. 14.

Catha edulis, Forskal, natural order Celastraceæ, is a shrub about 10 feet high, with smooth, elliptical, serrate, either opposite or alternate leaves, two or more inches long, and about an inch wide. It is largely cultivated in the interior of Arabia, and furnishes the *khat, cafta* or *Arabian tea.* The slender twigs with the leaves attached are gathered, carefully dried, and made up into closely pressed bundles, each containing about 40 twigs, tied together by strips of bark, the quality being known by the form and size of the bundles. The use of

this tea in Arabia, is said to antedate that of coffee; the effects of its use are said to be similar to those of strong Chinese green tea. The Arabs also chew the leaves, both in the green and the dried state, the effect of which is to increase the flow of hilarity and mirth, and to produce extreme wakefulness and watchfulness, an effect somewhat similar to that produced by coca.—*Phar. Jour. and Trans.*, 1883, April 14; *Ind. Agriculturist.*

Sulamita vitulus, a plant of the natural order Melastomaceæ, grows in Colombia, where it is used in neuralgic affections. The flowers have a strong and somewhat rose-like odor, and yield 1½ to 4 per cent. of volatile oil, which is heavier than water, and appears to be useful in perfumery.—*Rundschau, Leitm.*, April 10, 1883.

Opium Assays.—Four cases of Yerli, Karahissar, and Bogaditch opium assayed by Dr. Squibb, gave the following results: water 18·40 to 21·77 per cent., residue 29·40 to 34·83 per cent., morphine 12·15 to 13·27 per cent., morphine in powder 15·5 to 16·5 per cent.

Dr. Squibb also examined nine cases of Persian opium, each of the cases containing 160 plano-convex lumps, weighing 130 pounds. When assayed by his process ("Am. Jour. Phar." 1882, p. 244), it was noticed that although the ether extracted an unusual amount of narcotine, yet the morphine had retained about 4 per cent. of this alkaloid, which could not be removed by ether, but remained behind on dissolving the morphine with lime water. The opium contained much of a glucose-like substance, and comparatively little insoluble matter, one sample yielding 8·7 per cent. water, 24·3 per cent. residue, and 13 per cent. morphine. Calculated for dry opium the morphine varied between 12 and 14·3 per cent.—*Ephemeris*, No. 9, p. 290–283.

Hymenodictyon excelsum, Wallich; Natural order Rubiaceæ.—The bitter bark of this East Indian tree was examined in 1870 by Broughton, who found the fresh bark to contain aesculin, which in the dry bark was converted into aesculetin, the bark being almost tasteless. Recently W. A. H. Naylor isolated from the dry bark an alkaloid which seems to be closely allied to paricine, differing chiefly in containing more hydrogen. The bark was mixed with milk of lime, the mixture dried, exhausted by alcohol, the tincture acidified with sulphuric acid and the alcohol recovered by distillation. The residue was treated with hot water, filtered, and the filtrate precipitated with caustic soda. The precipitate, amounting to 1·75 per cent., was digested in a limited quantity of ether, the ether residue dissolved in

acetic acid, and the solution submitted to partial precipitation with ammonia or soda. The white gelatinous precipitate became yellow on drying, dissolved readily in ether, alcohol and chloroform, had no action on polarized light, and formed, with acids, amorphous salts. The solution in hydrochloric acid gave precipitates varying from grey to brownish yellow, with mercuric chloride, potassium, ferro- and ferridcyanide, potassium iodide, sodium phosphate, sodium and ammonium chloride, and sodium nitrate. The alkaloid differs from quinoidine in optical behavior, and in its platinum double salt containing less platinum; and from beberine in containing more carbon, and the double compound more platinum.—*Phar. Jour. and Trans.*, April 7, 1883.

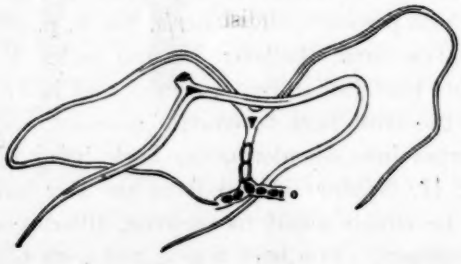
Mountain Sage; Sierra Salvia.—J. Moeller gives the following description of this bitter aromatic drug; the stems attain about the

Leaf, natural size.

Flowers, natural size.

Involucral scales, magnified.

thickness of a quill, are somewhat angular woody and with leafy branches. The leaves are short, petiolate, divided antler-like, the



Hairs, magnified 125 diameter.

upper ones lanceolate or spatulate, sessile, scarcely 5 mm ($\frac{1}{5}$ inch) long and 1 mm ($\frac{1}{25}$ inch) broad. The erect, nearly globular small flower-heads are on short pedicels in the axils of the leaves, either single or

in small racemes. The outer involucral scales resemble the leaves, the inner ones are broader, ovate, three-cleft, membranous and long-ciliate. The receptacle is flat, long-villose, and bears a small number of yellow tubular florets.

The hairs are quite characteristic, T-shaped; the basal cell projects somewhat above the dense cuticle, and is surmounted by two thin-walled stipitate cells and a terminal cell which is forked, thick-walled, and shows an internal cavity only at the fork. The hairs are colored faintly yellow by aniline sulphate. The author doubts the identity of the plant with Artemisia frigida, *Willdenow*, which is indigenous to Siberia.—*Phar. Centralhalle*, No. 17.

Phoradendron flavescens, Nuttall, mistletoe.—The drug consisting of dried stems, leaves and flowers, has been examined by J. Moeller. The stem fragments *a* are of the thickness of a quill and about the length of a finger, varying in color between gamboge-yellow and blackish brown, wrinkled and with opposite leafscars. The cuticle is thick, on the youngest branches beset with short conical thickened hairs, frequently in pairs; the bark is relatively thick, contains groups of stone cells and lighter colored bast bundles arranged in a circle, and is free from starch; the wood contains starch in the pith, in the medullary rays and in the scattered wood parenchyma cells. The leaves are smooth, when full grown, oblong or roundish elliptic, about 6 cm. long, sometimes spatulate, short petiolate, leathery, with the margin entire, the upper surface finely wrinkled and without visible nervation, the lower surface distinctly three-nerved and the nerves sparingly branched. The cuticle is thick; the epidermis consists of polygonal cells, and has on the lower surface numerous stomata; there is no distinct palissade layer, the mesophyll consisting of thin walled, loosely united cells with a few intercellular spaces, and containing tannin, mostly also yellow resin, and in scattered cells near the fibrovascular bundles, also crystalline groups of calcium oxalate.

Fig. 6.

Phoradendron flavescens, *Nuttall.* *a* stem, *b* leaf, *c* pistillate spike.

The flowers are axillary, in whorled spikes, quite small, somewhat imbedded in the axis, three cleft, the pistillate ones in two or three whorls, with a hypogynous one-celled ovary and a two-lobed stigma; the staminate flowers longer and denser with three stamens united to the base of the perianth.—*Phar. Centralhalle*, 1883, No. 14.

Ricinus communis as an insecticide.—Mr. Rafford, a member of the Société d'Horticulture . Limoges, has observed that flies disappear from a room in which a castor oil plant has been placed, the flies either being found dead under the plant, or their bodies clinging to the under surface of the leaves. It would, therefore, appear that these leaves exhale a principle, possessing strong insecticide qualities.—*Brit. Med. Jour.*

Geum album is regarded by Dr. W. A. Spurgeon as a valuable antiemetic, relieving gastric irritation and headache. He uses it in the form of a tincture, made with 8 troyounces of the plant to the pint; the dose is a teaspoonful or more.—*Virg. Med. Monthly.*

Agaricus albus.—E. Jahns has again examined this fungus, and compared his results with those obtained by previous investigators. It was exhausted with hot 90 per cent. alcohol, the tincture concentrated to the weight of the drug and cooled, when agaric acid separated in indistinct crystals mixed with white resins, the red bitter resin remaining in solution. The precipitate was collected, pressed, mixed with 10 times its weight of 60 per cent. alcohol, warmed in the water bath until the crystals were dissolved, and filtered while hot; the solution was evaporated, the residue repeatedly recrystallized from absolute alcohol, to separate the resin, until it was perfectly soluble in water. A little lime and magnesia was removed by recrystallization in presence of hydrochloric acid, and an amorphous body was separated by dissolving in hot 30 per ct. alcohol and cooling to 50°C., when pure *agaric acid* crystallized in delicate silvery plates. It crystallizes from alcohol in groups of prisms, is inodorous and tasteless, melts at 138° to 139°C., requires at 15°C. 126 p. of 90 per cent. alcohol for solution, is readily soluble in warm alcohol, glacial acetic acid and oil of turpentine, less soluble in ether, and nearly insoluble in chloroform, benzol and cold water. In boiling water it swells to a jelly-like mass, and dissolves finally to a strongly acid, somewhat ropy liquid. Its composition is $C_{16}H_{30}O_5.H_2O$, the water being partly given off over sulphuric acid, and entirely at 100°C. It is a bibasic triatomic acid, and homologous with malic acid. Its neutral alkali salts are easily

soluble in water and precipitated by alcohol in an amorphous condition, the sodium salt hardening to a radiating crystalline mass; the other salts are amorphous. The acid salts are little soluble in water, and with difficulty obtained pure. When boiled with nitric acid, agaric acid yields succinic acid and volatile fatty acids, among which butyric acid seems to predominate.

The white resins could be separated by treatment with boiling absolute alcohol into white needles and an amorphous body, the latter being freely soluble in strong alcohol.

The results are summarized thus: Hot alcohol dissolves from white agaric—

1. 16 to 18 per cent. of agaric acid, so named by Fleury (1870), and identical with the *laricin* of Martius (1845), in the main also with the *agaricin* of Schoonbroodt (1863), and possibly with the *pseudo-wax* of Trommsdorff; it forms a part of the white resin of Masing insoluble in chloroform (see "Am. Jour. Phar.," 1875, p. 208).

2. 3 to 5 per cent. of an indifferent body crystallizing in needles, fusible at 271° to 272°C. and sublimable; it forms part of Masing's white resin alluded to.

3. 3 to 4 per cent. of an amorphous white body separating from its solutions in form of a jelly, and identical with Masing's white resin soluble in chloroform.

4. 25 to 30 per cent. of an amorphous red resin-like mixture, having an acid reaction, a bitter taste, a purgative action, and easily soluble in alcohol and ether.—*Archiv d. Phar.*, April, 1883, pp. 260—271.

Cantharides contain, according to Eug. Dietrich, notable quantities of formic acid. This acid is the best solvent for cantharidin, the solubility increasing with the strength of the acid. Cantharidin dissolved in diluted formic acid, may be distilled.—*Phar. Post*, 1883, No. 18.

Composition of bones and bone ash.—Wildt has shown (Landw. Versuchsstat. xv. p. 404), that bone ash contains less carbonic acid than the bone from which it is prepared, and since caustic lime is not formed he attributes this to the reaction between dicalcium phosphate and calcium carbonate, resulting in the formation of normal calcium phosphate and the liberation of carbonic acid and water.

H. Weiske shows that bone ash contains sulphate, which is not found in bones, and must therefore be produced from the organic con-

stituents during the incineration. On analyzing a number of sheep bones, the carbonic acid was found to vary in the different bones between 2·58 and 3·55 per cent., while in the bone ash the variation was between 0·68 and 1·31 per cent., strong ignition evidently decreasing the amount. The sulphuric acid, SO_3, in the bone ash, varied between 0.40 and 0.90 per cent., strong ignition showing scarcely any influence on the result. The relation of the figures are such that the effect of the sulphuric acid formed does not alone explain the loss of carbonic acid, but that also a conversion of dicalcium into tricalcium phosphate, as explained above, must take place.—*Zeitschr. physiol. Chem.*, 1883, 474–478.

RECENT PROGRESS IN THE SODA INDUSTRY.

By G. Lunge.

In the introduction to this extensive paper, the author mentions that although most of the subjects have already been published elsewhere, the information is in many cases so imperfect, that it was thought desirable to discuss this important question more minutely. In the first place attention is called to the want of uniformity in specific gravity tables, a question which affects, not only the soda industry, but almost all other branches of technical chemistry. Messel has compiled a table showing the wide differences in the specific gravity of sulphuric acid and ammonia obtained by various investigators. Squire calls attention to the fact that the tables published in books are drawn up for pure substances, and are therefore often useless for commercial products. The author cannot agree with Messel, who states that the differences can hardly arise from impurities in sulphuric acid made from sulphur.

Referring to gas generators, the author quotes as a novelty, Wilson's gas producer, used in England for steel furnaces, copper-smelting furnaces, glass and porcelain furnaces, and applied to Mactear's decomposing furnace.

As to the progress made in the manufacture of sulphuric acid from pyrites, it is mentioned that the so-called self-burners, which are generally used in Germany, are now coming into extensive use in England. The process of Benker and Lasne, based upon the introduction of sulphurous anhydride and steam into the chamber exit gases before they reach the Gay-Lussac tower, does not appear to have given satisfactory results. The use of potassium nitrate in the form of an acqueous solution has also been abandoned.

Lovett, in a paper on the testing of noxious vapors, describes a number of absorption-apparatus and several forms of aspirator (*J. Soc. Chem. Industry*, 1882, 209.)

Referring to Hurter's dynamic theory of the manufacture of sulphuric acid, the author points out that it must be considered a most valuable research in pure chemistry. Hurter attempts to show, accordiug to mathe-

matical principles, the connection which exists between the dimensions of the chambers, the composition of the gases, the intensity of the reaction and the consequent temperature in the chambers, as depending on the method of combining single chambers into sets. He thinks he has been successful in finding a law applicable to more complicated reactions, which he expresses in the following words: "The rate of chemical change depends on, and is proportional to, the facility with which groups of molecules favorable to the particular change can form in the system in which the change occurs." Hurter does not give the deduction itself, but merely a differential equation based thereon, into which he introduces the amount of sulphurous anhydride, oxygen, water and nitrogen compounds, in order to find the dynamic equation representing the rate of the formation of sulphuric acid in the chambers. He obtains the following results:

1. As the chamber space is increased in arithmetic progression, the amount of sulphurous anhydride not converted into sulphuric anhydride decreases in geometric progression.

2. The chamber space for a given fixed loss of sulphur is proportional directly to the loss of the gas, or, what is the same thing, to the amount of sulphur burnt.

3. The chamber space is inversely proportional to the nitrogen compounds and aqueous vapor present.

Hurter's conclusions as to temperature show that the excess of temperature of the chambers over the surroundings for successive chambers decreases in geometric progression, and that the temperature of the leading chamber depends on the number of chambers which are connected into one system.

In discussing the manufacture of sodium sulphate, Lunge mentions that the substitution of machine power for manual labor is becoming more and more of an accomplished fact. In England the processes of Jones and Mactear are competing with each other. Since the construction of the furnace devised by Jones and Walsh has been altered, this furnace is said to work satisfactorily, although it is less generally employed than Mactear's salt cake furnace. In general construction this furnace is very similar to Mactear's carbonator, there being, however, no central opening, but a central division or pot, into which the salt and acid are continually fed. This pot serves as a mixing vessel, from which the thin, pasty mass flows over into the first division of the bed, where the first stage of the process is completed. It then passes successively through the other division until it reaches the outer circumference of the furnace, where it passes into the delivery trough which runs all round the furnace, and is luted to prevent escape of gas. The materials are mixed by means of an agitator placed between the two flues, through which the acid vapors mixed with the products of combustion pass away to the condensers. The heating of the furnace may be carried out as most convenient, care being taken to obtain thorough combustion, so as to prevent soot being passed on into the condensers. The great advantage of this continuous system of decomposing salt is to be found in connection with the condensation of the hydrochloric acid. The salt-cake as it is withdrawn is almost entirely free from smell or acid vapor; there is no difficulty in making sulphate of 97 per cent. from common white salt. The advantages may be summarised as follows:

Reduced cost of labor and fuel, and economy of sulphuric acid. Complete condensation without wash-towers, no weak acid being produced. Hydrochloric acid formed of greater strength than by an open furnace, and equal to the best form of closed furnace. Complete removal of nuisance caused by escapes of acid vapors during the working or discharging. Small amount of wear and tear, and low cost for repairs. Better quality of salt-cake, rendering it specially suitable for glass-making purposes. Ability to use rock salt alone. Less outlay for plant to decompose a given amount of salt and condense all the acid. Referring to the decomposition of salt in hand-furnaces, Deacon's furnace has been introduced into most works using muffle furnaces.

According to Weldon, the preparation of anhydrous sodium sulphate from crystallized Glauber salt by Pechiney's process, is effected on a large scale in the following manner: At the salt works of Giraud, the mother-liquor left after the salt has crystallized from the salt water when subjected to cooling, deposits large quantities of sodium sulphate, associated with 10 atoms of water. Pechiney adds to Glauber salt a certain proportion of "sels mixtes," *i. e.*, a mixture of sodium chloride and magnesium sulphate, which is deposited during the concentration of the mother-liquor to 35° B. by sun heat. The mixture is then introduced into iron cylinders, and heated to 70–80. When a temperature of 35° has been attained, the contents of the cylinders are found to have become a mixture of anhydrous sodium sulphate with a saturated solution of "sel mixte," the latter having dissolved in what was the water of hydration of the sodium sulphate. The whole is then machined at a temperature not under 35° (hence Pechiney's object in heating to 70—80), when the full quantity of anhydrous sulphate corresponding to the hydrated sulphate treated is obtained. The whole process is performed in a very short time, and its only cost is for a small amount of labor and steam. The solution filtered from it is employed for the production of more hydrated sulphate.

Parnell has made a series of trials on the action of potassium nitrate in the manufacture of caustic soda, the results of which confirm the conclusion previously arrived at, namely, that the ammonia evolved from the boiling liquors in the Leblanc process is due to cyanide, and does not arise from the decomposition of the nitrate.

Referring to the improvements in the manufacture of chlorine, Lunge mentions Strype's process of purifying hydrochloric acid from sulphuric acid by means of calcium chloride. This method, which is worked successfully at Wicklow, consists in adding to the hydrochloric acid in the cold about 20 per cent. of its volume of the solution of calcium chloride, obtained as a bye-product in the Weldon process. Thus almost the whole of the sulphuric acid originally present in the hydrochloric acid is precipitated, and may be separated by filtration.

In the manufacture of potassium chlorate, as at present ordinarily conducted, there is a loss of from 15–25 per cent. of the total chlorate produced. According to Pechiney's improved method, this loss is reduced to below 5 per cent. The improvement in question was devised for the purpose of reducing the cost of preparing sodium chlorate, now extensively used in the printing of aniline-black. Pechiney, in investigating the solubility of a

mixed solution of sodium chlorate and chloride, found that not only does the solubility of sodium chlorate increase with the temperature, but it increases to such an extent that mere concentration by evaporation of a mixture of these salts will cause practically the whole of the sodium chloride to fall down, leaving sodium chlorate alone in solution. The disadvantages of this process are, the large amount of sodium sulphate required by the reaction

$$CaCl_2O_6 + 5{\cdot}5CaCl_2 + 6{\cdot}5Na_2SO_4 = 2NaClO_3 + 2NaCl + 6{\cdot}5CaSO_4;$$

the unavoidable loss of sodium chlorate; its separation from the large amount of calcium sulphate, and the expense of evaporating the wash waters. The presence of so large a proportion of sodium chloride was a further cause of loss of chlorate. Pechiney surmounted these difficulties by removing the 5·5 molecules $CaCl_2$, which are unavoidably formed in the preparation of 1 molecule $CaCl_2O_6$, and thereby reducing the quantity of calcium sulphate and sodium chloride considerably. The method consists in evaporating the crude chlorate liquor until its density is 48° B. The liquor is then cooled to 12°. Of its 5·5 mols. of calcium chloride, 4·3 mols. are thus caused to crystallize out as $CaCl_2,2H_2O$. The concentrated solution must be cooled to at least 12°, or this proportion would not be separated; it must not, however, be cooled below 10°, or calcium chlorate would be deposited as well. The crystals obtained between these limits of temperature are free from calcium chlorate, and are of a nature permitting them to be separated completely from their mother-liquor by means of the hydroextractor. The mother-liquor consists of 1 mol. $CaCl_2O_6$, and 1·2 mol. $CaCl_2$. It is diluted with its own volume of water, treated with three times 1·2 mol. lime, and heated to 80°, to determine the formation of calcium oxychloride. It is then cooled and filtered. The filtrate consists of a solution of 1 mol calcium chlorate and only 0·3 mol. calcium chloride, and thus contains one-eighteenth of the proportion of calcium chloride originally present, so that the above-mentioned loss is considerably reduced.

In conclusion, the author discusses the recovery of sulphur from soda-waste. At Salindres, Pechiney simply injects air into the liquor by the aid of Körting's injector, and then when oxidation has just reached the point at which treatment of the product by an acid would not cause evolution either of sulphuretted hydrogen or of sulphurous anhydride, he decomposes the product by hydrochloric acid. During the operation of oxidizing the liquor, there occurs a considerable precipitation of lime, in a peculiarly dense state, and readily separable. Owing to this separation, the quantity of hydrochloric acid is appreciably reduced. Kingzett recommends to dry the soda-waste in the air, then grind it, and finally melt it with coal-tar pitch, for the purpose of asphalt-making. After referring to Mond's sulphur recovery, Lunge describes and discusses at length the process invented by Shaffner and Helbig, as recently reviewed by Weldon (*J. Soc. Chem. Industry*, 1882, 45), and Chance (*J. Soc. Arts*, 1882, 727; and *J. Soc. Chem. Industry*, 1882, 264).—*J. Chem. Soc.*, 1883, 524.

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

AMERICAN PHARMACEUTICAL ASSOCIATION.—The Thirty-first Annual Meeting of this Association will be held in the city of Washington, D. C., on the second Tuesday, the 11th day of September, at 3 o'clock P. M., in the Smithsonian Institution, where also room has been provided for the exhibition of articles possessing pharmaceutical interest. It is expected that the meeting will be largely attended by pharmacists from all sections of the country, and that the reports of committees, the replies to queries and the volunteer papers will furnish much interesting material for discussion. The national capital is easy of access, the accomodations for a large assemblage are ample, and many of the institutions afford considerable opportunity for profitable study.

Delegates are reminded that their credentials should be sent to the Permanent Secretary, Prof. J. M. Maisch, Philadelphia, at least two weeks in advance of the meeting.

Applicants for membership should, if possible, send their applications with the requisite funds to the Chairman of the Committee on Membership, Mr. G. W. Kennedy, Pottsville, Pa., at least two weeks before the meeting.

The Local Secretary, Mr. Charles Becker, West Washington, D. C., will give all information to those who may wish to exhibit suitable goods.

The Committee on Entertainments, Mr. George J. Seabury, New York, Chairman, will soon issue circular with the programme of the entertainments projected for the time when the Association will not be in session.

Lancaster Pa., July, 1883. CHARLES A. HEINITSH, *President.*

THE NATIONAL RETAIL DRUGGISTS' ASSOCIATION will doubtless be organized in Washington, September 10th next. The convention will assemble at 10 o'clock A.M., on the date given, in the lecture room of the Smithsonian Institution. To facilitate the organization a carefully considered draft of constitution and by-laws has been prepared and distributed by the Massachusetts delegation, the proposed annual dues being fixed at $2.

INDIANA STATE PHARMACEUTICAL ASSOCIATION.—The first annual meeting was held at Indianapolis, May 22-24. At the first session President G. H. Andrews delivered his annual address, and the various officers and committees made their reports. On the following days a number of papers were read and the following officers were elected: N. W. Yeakle, Lafayette, President; H. J. Watjen, Vincennes, F. H. Carter, Indianapolis, and A. W. Binford, Crawfordsville, Vice-Presidents; E. Martin, Indianapolis, Treasurer; and J. R. Perry, Indianapolis, Secretary. The next annual meeting will be held at Evansville, the time to be fixed by the Executive Committee.

ALABAMA STATE PHARMACEUTICAL ASSOCIATION.—The second annual

meeting was held at Selma, May 8th and 9th. The annual address was delivered by President Candidus; the usual reports and several papers were read, and the proposed pharmacy law was discussed. The next meeting will be held at Montgomery. The officers serving for the present year are: P. C. Candidus, Mobile, President; A. W. Cawthon, and C. C. Heidt, Selma, Vice-Presidents; E. P. Galt, Selma, Treasurer; M. M. Stone, Selma, Secretary.

EDITORIAL DEPARTMENT.

THE AMERICAN PHARMACEUTICAL ASSOCIATION.—In another place we publish the President's official notice concerning the next meeting, and invite thereto the attention of our readers. We have been informed by the Entertainment Committee that most railroads have consented to issue round trip tickets at rates equal to about one and one-third fare; the particulars concerning these arrangements will be given in the circular to be issued by the committee at an early date. At the request of the committee we have applied for similar concession from Philadelphia and vicinity, and have received the assurance that excursion tickets will be issued from points on the line of the Pennsylvania Railroad upon card orders. The date to which the return coupons will be made good has as yet not been fully decided upon; but it is likely that the tickets, going and returning, will not only enable the holder to attend both the convention of the National Retail Druggists' Association and the meeting of the American Pharmaceutical Association, but likewise allow a few days before and after these meetings to devote to relaxation from labor. Particulars will be announced in our next issue.

A number of the Eastern members will probably make a sea voyage from New York to Norfolk or Newport News, thence by rail to Washington. This trip is the same as that so heartily enjoyed by many of those who attended the Richmond meeting in 1873.

FRED. B. POWER, PH.G., PH.D., recently Professor of Analytical Chemistry in the Philadelphia College of Pharmacy, has received and accepted a call from the University of Wisconsin to take charge of the School of Pharmacy which is about to be organized as a part of the institution named. Professor Power takes to his new field of labor the good wishes of his numerous friends, who appreciate his earnest and unremitting toil in the cause of pharmaceutical science. The new school is the result of a conference between the officers of the State University and the Wisconsin Pharmaceutical Association (see "Am. Jour. Phar.," 1882, p. 474), the initiative having been taken by the latter body.

The Committee on Instruction of the Philadelphia College of Pharmacy has taken measures to fill the vacancy created by Prof. Power's resignation, so that no interruption in laboratory instruction will take place; the plan will be submitted to the Board of Trustees for final action.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Nineteenth Annual Report of the Alumni Association, with the Exercises of the Sixty-second commencement of the Philadelphia College of Pharmacy, for the year 1882–1883. 8vo, pp. 180.

The title of this good-sized and well printed pamphlet explains only in part its contents, or rather the "Report" embraces all the transactions of the Alumni Association during the preceding year: the minutes of the Executive Board; minutes of the social meetings, together with the papers then read and the discussions on these and kindred subjects; minutes of the annual meeting; the commencement exercises; the introductory, valedictory, and other addresses; account of the examinations of the College; report of the Zeta-Phi-Alpha Society; list of members, etc. The publication will doubtless be prized by the numerous alumni of the College for the information it contains about College matters and student's life at the present time; and by the members of the last class for the record of transactions in which they participated. The report being considerably more voluminous than its predecessors, would be improved by the addition of a table of contents.

Proceedings of the Connecticut Pharmaceutical Association at the Seventh Annual Meeting, held in Hartford, February 6 and 7, 1883. New Haven, 8vo, pp. 104.

Among the papers read we notice more particularly the following: On Emulsions Containing 50 per cent. of Oil, by C. F. Gorman; On the Detection of Adulterations of essential Oils, by P. L. Lind; On Ointment of Nitrate of Mercury, by J. Hodgson. The officers for the present year, are E. S. Sykes, Hartford, President; N. J. Beers, New Haven, and J. C. Nichols, New London, Vice-Presidents; F. Wilcox, Waterbury, Secretary; G. P. Chandler, Hartford, Treasurer; and E. A. Gessner, Local Secretary. The next annual meeting will be held in New Haven, in February, 1884.

Elixirs, their History, Formulæ and Methods of Preparation, including practical processes for making the popular elixirs of the present day and those which have been officinal in the Old Pharmacopœias; together with a resumé of unofficinal elixirs from the days of Paracelsus. By J. U. Lloyd, Professor of Pharmacy in the Cincinnati College of Pharmacy, etc. Cincinnati: Robert Clarke & Co., 1883, pp. 187.

This little book opens with a letter from Dr. Charles Rice, explaining the derivation of the word "elixir" from the Arabic, being composed of the article *al* or *el* and the word *iksir*, the latter being the Greek *xirion*, which in medical works means any "dry powder," and in alchemy was used to denote the "magical transformation powder, so much sought after, a pinch of which would convert a whole mass of base metal into gold." In this sense *iksir* is identical with the Arabic term *kimiyá*, which is also derived from the Greek and from which the word "chemistry" originated. Later the word "elixir" was used as synonymous with "liquid tincture," the first step in the preparation of the philosopher's stone, or it designated any compound preparation of supposed "sublime" properties, reputed to pro-

long life and to ward off disease. Prof. Lloyd shows that the elixirs formerly used in medicine and those which are still recognized by European pharmacopœias, are with very few exceptions not sweetened; that the idea accepted in our country at the present time regarding what should be the attributes of an elixir is strictly an Americanism, and that these American elixirs would be better defined by the term *cordial*.

It was not an easy task for the author to collect and critically examine the numerous formulas for elixirs which are scattered through the journals and other publications during the past 24 years; but it has been accomplished, and the author's own experience with this class of preparations has been added, introducing improvements and practical useful suggestions. Of the old-fashioned elixirs, all the important ones have been selected, mostly with the more or less modernized formulas.

The book gives full, and what is better, reliable information about the numerous elixirs more or less in use, and as long as physicians will continue to prescribe these "ready made" somewhat medicated preparations, it will be of great practical usefulness. With the admission into the new Pharmacopœia of the Elixir Aurantii as an agreeable vehicle, it may be hoped that the prescriber will gradually learn to order the extemporaneous preparation of elixirs suited to each case, instead of suiting the case to the ready made elixir; and when the numerous formulas for special elixirs shall have become things of the past, Professor Lloyd's book may then not be as frequently consulted for the practical use to be made of it, but it will retain a permanent value as a good work on a line of preparations, which, for a time, had been permitted to assume greater importance than they deserved.

Oil, Paint and Drug Reporter Yearbook, 1883. New York: Wm. O. Allison. Pp. 179.

Devoted mainly to the oil interest of the United States, we find in this little volume the rules adopted by the New York Produce Exchange for regulating transactions in petroleum and in oils; also, statistical information concerning the production, importation, exportation, price, etc., of these articles for a series of years. Similar statistical tables are also given for drugs and chemicals.

The Mineral Waters of Europe, including a short description of Artificial Mineral Waters. By C. R. C. Tichborne, LL.D., F. C. S., M. R. J. A., etc., and Prosser James, M.D., M. R. C. P., etc. London: Baillière, Tindall & Cox. 1883. 12mo., pp. 224.

Various natural causes contribute to the gradual variation in the composition of the waters of mineral springs, and when they are bottled, the loss of gas likely to be occasioned by the operation, causes other changes. Many of the analyses usually published, were made at a date, when the means for the recognition and quantitative determination of some of the mineral constituents were far inferior to what they have become more recently; a re-examination of such waters from time to time would therefore seem to be desirable, and is occasionally made in Europe. Professor Tichborne has made nearly one hundred new analyses of bottled mineral waters, and embodied the results obtained in the work before us, which contains also a

large number of recently made analyses by other chemists, the results being in nearly all cases calculated in grains for one imperial gallon.

The classification adopted is as follows: 1, saline or aperient; 2, alkaline or antacid; 3, ferruginous or chalybeate; 4, sulphurous, and 5, potable or indifferent; the latter embracing Seltzer, Taunus, Apollinaris, some of the Kissingen waters and others which are less known in this country. All the more important mineral springs of Europe are considered; in many cases, however, as for instance, Carlsbad, only one or two of the important springs have been selected as typical ones. Brief notices of the localities are given, but the main object, the nature of the mineral water, has been constantly kept in view and is fully, though tersely discussed. In the chapter on artificial mineral waters, the aërated solutions of several salts directed by the British Pharmacopœia are discussed, in connection with such drinks sold under the name of ginger ale, etc., and with imitations of the natural springs. The authors are evidently not in favor of the latter class. It is true that the best analyses of natural mineral waters do not represent the actual grouping of the elements as they originally existed in the water; but when the saline ingredients of artificially prepared waters have been placed under similar conditions which exist in the natural waters, a rearrangement of the elementary grouping must take place, and it is for this reason that in scientifically constructed formulas for imitation waters the salts ascertained by analysis are used to a certain extent only, the remainder being purposely formed by chemical action. No doubt our intimate knowledge with a mineral water increases with each examination, and it would be well, perhaps, to have such an examination made yearly; it would show actual changes that may have occurred, but such changes would bear alike on the natural water as on the artificial made in accordance with a previous analysis. That artificial mineral waters are sometimes at best clumsy imitations or concoctions which have nothing but the name in common with the pattern after which they profess to be modelled, is doubtless the case; but such is a fraud no less than the sophistication of food and drugs. We do not believe that the manufacture of artificial mineral waters could never be conscientiously carried out; but it requires the same scrupulous care and thorough knowledge that should characterize the dispensing of medicines.

The chapters on the therapeutic action and uses of the several mineral waters are from the pen of Dr. Jones and contain also hygienic and dietetic suggestions appropriate to the use of the waters. The concluding chapters give a tabular classification of the mineral springs arranged according to the predominating chemical constituents. and a list of the chief thermal springs with their temperature.

We regard the book as a valuable addition to the literature on the special subject of which it treats, and though this is of primary interest in Europe, still considering the large amount of European mineral waters consumed in this country, the work treating as it does especially of the condition of the bottled waters, claims a like practical interest here, at least as far as these waters are concerned.

A Rectal Obturator. By David Prince, M.D., Jacksonville, Ill. From the St. Louis "Medical and Surgical Journal."